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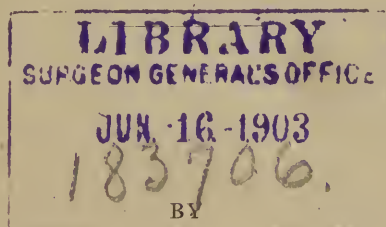
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THE
NOSE AND THROAT
IN
MEDICAL HISTORY.



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THIS BOOK IS DEDICATED TO THE MEMORY
OF MY FATHER.

PREFACE.

A few words may not be amiss in the way of preface to this history of the development of our knowledge of the nose and throat. No one can have engaged in any such laborious task as this without being painfully conscious at the last of the liability, nay, the probability that many errors of omission and commission will be noted by others in one's work. For these I can only solicit the reader's charity.

An attempt has been made to link together the story of the records of the nose and throat in medicine with the general drift of medical history, with the salient features in the early history of the civilization of mankind and with the general literature which has a bearing upon the central subject of the work; for, as Huxley has said: "Science and literature are not two things, but two sides of one thing." This has been done in constant fear of rendering my story too verbose and pedantic, but with the earnest hope of riveting the attention of the reader in a way which can not be attained in the routine preparation of an encyclopedia or a dictionary. I have also ventured to hope that the information thus laboriously offered will not, on account of its form, prove less accurate or extended because an attempt has been made to make it more attractive. If I have failed in realizing these ideals—and who ever fully succeeds?—I may comfort myself with the reflection that the labor expended in an attempt to attain them has been fully repaid by my pleasure in the work itself.

In the preparation of this work I have taken my notes chiefly from the original sources. In addition I have made use of many historical works both of medicine and of general literature. Among the former those of Sprengel (the French edition of his history), Baas (in English translation), Whittington, and especially Gordon Holmes' "History of the Progress of Laryngology," (*Med. Press and Circular*, July 15, seq. 1885), and Heyman's "Geschichte der Laryngologie und Rhinologie" in his "Handbuch;" among the latter those of Buckle, Guizot, Freeman, Draper, Lecky, Gibbon, Grote, Ranke, Prescott, Renan, and many others have been systematically read during the course of my work.

The space of a preface would not suffice for acknowledgment of indebtedness to all the works consulted.

INTRODUCTION.

In every age there have been attempts to draw from the appearance of the countenance, especially from the shape and size of the nose, prognostications as to the mental and physical attributes of men; but although many are the rules laid down for the guidance of observers, they are of little value; for while doubtless the features tell their story to us occasionally, if we are close observers, in spite even of the modern and scientific treatises of Bell and of Darwin, the expressions are too fugacious and elusive to allow us to gather from them any reliable data as to the characteristics of the individual.

No longer ago than 1820 we find it stated in a scientific work* that "a long and pointed nose passes for a sign of sagacity. A short and blunt nose marks a simplicity of mind, easy to deceive and with very little foresight. A little nose, thin and movable, denotes a natural mocker. Large noses are an indication of heaviness, for they bespeak the lymphatic nature of the complexion. Twisted noses, they say, are a sign of an obliquity of mind; but an aquiline nose, large and muscular, announces force and courage; a flattened nose an inclination to luxury; in fact, it is thought there is a correspondence between the sexual organs and that part of the countenance."

Physiognomy
of the Nose.

"Nascitur ex labiis quantum sit virginis antrum
Nascitur ex naso quanta sit hasta viri."

This is not a quotation drawn from a literature especially tainted with the ideas of Lavater.

On the testimony of Plutarch we learn that the Persians most admired the hawk-nosed type of man as resembling Cyrus, their best beloved king. This saying we find echoed in the sixteenth century by Riolan† and Laurentius‡, the latter declaring, with how much truth I do not know, that the Egyptians in their hieroglyphs use the figure of a nose to designate a man. We may plainly see the type

* "Dict. des Sciences Medicales," Vol. XXXXII, P. 220.

† "Opera Omnia," 1610, Cap. LIII, De Naso.

‡ "L'Histoire Anatomique" Traduit, par Size, P. 1374; Ed. 1610.

of Cyrus in Bellini's portrait of the Sultan Mohammed.* We learn from the Old Testament (Levit. XXI, 18) that there was a prejudice among the Patriarchs against flat-nosed people.

But in spite of these predilections of the Caucasian race we find among the native negroes and the Chinese different ideals as to the beauty of the nose. "The ancient Huns during the age of Attila were accustomed to flatten the noses of their infants with bandages for the sake of exaggerating a natural conformation. With the Tahitians to be called long-nosed is an insult and they compress the noses and foreheads of their children for the sake of beauty. So it is with the Malays of Sumatra, the Hottentots, certain negroes and the natives of Brazil."†

In attempting to present an outline of the growth of our knowledge of the nose and throat and of their diseases, it must be remembered that a complete and intelligent review of the subject can not be obtained by beginning our study with the discovery or rather with the introduction of the use of the laryngoscope. That would be a consideration of the history of laryngoscopy and its sequelæ in the history of the diseases of the upper-air tract, and of the growth and development of technical skill. However great may have been the revolution wrought by Türck and Czermak in this field, the history of rhinology and laryngology begins not with the invention of the speculum and the laryngeal mirror, but with the earliest records of the civilization of man. In fact, it is reasonable to conjecture that it is only the lack of records which prevents us from tracing knowledge of the diseases of the nose and throat still further back into prehistoric times. It must necessarily be that any disease of the respiratory system causing obstructive dyspnea, or any affections causing deformity and discharge from the nose, would have attracted the attention of the medicine men of our primeval ancestors. Injuries to the head must, as frequently then as now, have involved the nasal organ. Indeed, we shall find in the very earliest Hindu and Greek records evidences of the care and attention devoted to the study of this branch of the medical art. We shall also find that to some extent the nose and nasal disease in the earliest times possessed proportionately a larger interest for medical men than it did in more recent and more enlightened times, until the beginning of the growth of what we are pleased to call Modern Rhinology. Exposed to accidental and

* This may be conveniently referred to in Mrs. Oliphant's "Makers of Venice."

† Darwin's "Descent of Man," Part III, Chap. XIX.

intentional injury in the sports and wars of the ancients, mutilated by the deliberate acts of a cruel justice before the days of jails, or in the fierce outbursts of passion and revenge, traumatic conditions of the nose have occupied necessarily not only a very large place in the medical literature, but in the secular writings of former civilizations:

"Atque hic Priamiden laniatum corpore toto
Deiphobum vidit, lacerum crudeliter ora,
Ora manusque ambas, populataque tempora raptis
Auribus et truncas inhonesto volnere naris."

—VIRGIL, *Aeneis* VI, 494.

Innumerable colloquial phrases in all known tongues still testify to its importance as a symbolical figure of speech.

It would seem that the remarkable coincidence, pointed out by Hvorka*, that the word "nose" has the same stem in all known European languages, might be explained, as he suggests, on phonetic principles, and it is very likely that the nasal resonance of the "n" followed by a vowel has had an influence in preserving the stem from radical changes, but it is difficult to see why, on this ground, the sibilant "s" should enter almost universally into the word. The following is the list of languages quoted by Hvorka in a little different sequence, with the accompanying word for nose:

Etymology of
Nose.

Sanskrit	Nās	Danish	Noesen
Old Indian	Nāsā	Netherland	Neeus
Old Persian	Nāna	Modern German	Nase
Zendic	Nāonha	Old Slavonic	Nosz
Hebraic	Nohar	Old Bulgaric	Nosŭ
Greek	ῥίς	Old Prussian	Nozy
Latin	Nasus	Lithuanian	Nosis
Italian	Naso	Lettic	Nasis
Spanish	Nariz	Bohemian	Nos
French	Nez	Polish	Nos
Gothic	Nasa	Polabian	Nūs
Old Norse	Nös	Upper and Lower Sorbian	Nos
Old German	Nasa	Russian	Nos
Middle German	Nase	Servian	Nos
Anglo-Saxon	Nose	Croatian	Nos
English	Nose	Slovenic	Nos
Swedish	Näsan		

It thus seems evident that there has been a direct transmission from the ancient Sanskrit of the word nose to the modern languages of Europe, one of the innumerable etymological evidences

* Hvorka: "Die Aeussere Nase." 1893.

of the origin of our branch of the human race. If we look at a photograph of a miscellaneous group of natives of Calcutta or Bombay, and then glance out of the window at the pedestrians along Broadway or the Strand, we will note that not only the word has been transmitted, but the characteristics of the feature for which it stands.

It may not be without interest in this connection to supplement Hvorka's investigations by examining other languages having no known affiliation with the so-called Aryan stock:

Chinese	Pe
Japanese.....	Hana
Congolese (Africa).....	Djolo
Mexican (Nahaute)	Yacatl

SOUTH AMERICAN INDIANS.

Aymara.....	Nasa
Moxas	Nusiri
Incas (Quichua)	Seneca

NORTH AMERICAN INDIANS.

Cree.....	Miskiwan
Lenape (Delaware)	Wikiwan
Onondaga	Onionchia
Chinook	Bekats
Clallam (Wash. Territory).....	Nuk'su

A number of vocabularies of other North American languages show no such conformity as the European languages. There is, however, as will be seen, a suggestion of a common derivation of the word even as between the tongues of the three continents (Europe, Asia, America), but it would lead us too far astray to pursue the question further. It will be noted that the persistence of the nasal "n" and the sibilant "s" is not so marked in the languages of the non-Aryan races of the world.

THE NOSE AND THROAT IN MEDICAL HISTORY.

EGYPTIAN MEDICINE.



IN a volume published from the unfinished manuscript of A. Mariette Bey, entitled "*Les Mastabas de l'Ancienne Empire*,"* among many others is a fac-simile of a drawing on a slab found in the tombs of one of the old Egyptian kings. The grave in which the slab was found is said to date back to the fifth dynasty, a matter of 3500 years before the birth of Christ. On the slab is the delineation of a physician and his wife with her hand resting affectionately on his shoulder. He was the medical attendant of King Sahura and his name was Sekhet'enanch, but what the name of his wife does not appear. It is said to have been everywhere erased from the tablets. What subsequent domestic infelicity this may hint at does not appear. Edward Meyer in his "*Geschichte des Alten Ægyptens*" (II, P. 95) translates some of the inscription relating to the physician in such a manner that it appears the king had ordered it to be engraved as a testimony of gratitude to his doctor because he had "made his nostrils well." He wishes him, therefore, long life and happiness. This tablet had formerly been set up in the king's palace in an ante-room where all might see and read. We see hereby not only the antiquity of medicine, but also the antiquity of certain propensities which have not yet disappeared, so the uncharitable say, from the activities of its devotees; for we read further in Meyer's text that this method of recompense was suggested to the king by Sekhet'enanch himself. Truly "*Vita brevis, ars longa*." However, it does not appear that this early practitioner of medicine and violator of medical ethics was necessarily a rhinologist, for

The First Physician.

* On Plate D 12.

the word "nose" in this place, according to the translator, seems to have signified "breath of life." This, of course, makes the meaning of the passage very indefinite. It is an indication, however, that five thousand years ago they recognized the nose as belonging to the respiratory system, a fact to which it has frequently been necessary to draw attention in later, and we are fain to believe more enlightened times. Voltolini* has quoted Moses for authority (Genesis II, 6), that the nose was recognized as an organ of the respiratory apparatus when the "Lord God formed man of the dust of the ground and breathed into his nostrils the breath of life."

Specialists in
Egypt.

This reference and several others in the Sacred Writings point directly to the nostrils as emblematical of life and of the soul. It is not at all improbable that this figure of speech had its origin in Egypt where the nostrils were the route by which the contents of the cerebral cavity were extracted in the more expensive methods of the universal practice of embalming the dead. The exodus of the people of Israel from Egypt is said to have taken place at a date subsequent to that ascribed to the compilation of the "Papyros Ebers" (1550 B. C.) As to the possibility of Sekhet'enanch having really been a rhinologist we are supported only by a single historical reference. Herodotus (II, 84) makes a very positive statement as to specialization in Egyptian medicine, but makes no reference to rhinology, unless we suppose reference to the head to include affections of the nose and throat. The passage reads in Rawlinson's Translation (Vol. II, P. 136) thus: "Medicine is practiced among them on a plan of separation; each physician treats a single disease and no more; thus the country swarms with medical practitioners, some undertaking to cure diseases of the eye, others of the head, others again of the teeth, others of the intestines, and some those which are not local." "*ἡ δὲ ἰητρικὴ κατὰ τάδε σφί δέδασται· μίης νοῦσον ἑκαστος ἰητρός ἐστι καὶ οὐ πλεόνων. πάντα δ' ἰητρῶν ἐστι πλέα· οἱ μὲν γὰρ οφθαλμῶν ἰητροὶ κατεστᾶσι, οἱ δὲ κεφαλῆς, οἱ δὲ ὀδόντων, οἱ δὲ τῶν κατὰ νηδύν, οἱ δὲ τῶν ἀφανέων νοῦσων.*"

Maspero† and Erman‡ are both inclined to believe that Herodotus somewhat exaggerated the extent to which the specialization of medicine was carried in ancient Egypt, but Montaigne, that garrulous and delightful old French classic, not only credited

* "Die Krankheiten der Nase," 1888.

† Maspero: "Dawn of Civilization."

‡ Erman: "Life in Ancient Egypt."

the statement of Herodotus but approved of it, for he says: *
 "The Egyptians were right in neglecting the general calling of physician and of dividing the profession; for each illness, for each part of the body, there was an attendant, and therefore each part was more skillfully and less blindly treated, because they studied each one specially."

It has been conjectured that this specialization of medicine in Egypt, when at the height of her civilization, was due to the same causes which have produced it to-day. The teeming population, in the fertile, irrigated valley of the Nile, dwelt largely in cities † and these enormous aggregations of population, which is the striking phenomenon of modern civilization, furnish the only conditions under which such subdivision of the arts and sciences is possible. The whole matter, however, resting as it does upon this passage in Herodotus, is involved in much doubt and uncertainty. ‡

Whether these old Egyptians had specialists or not, it is evident from the "Papyros Ebers" that they had physicians who observed and knew how to treat diseases of the nose and throat after a fashion. This "Papyrus" is the earliest of all books on medicine and is said to have been compiled about 1550 years before Christ §, but even the date of its compilation is somewhat conjectural, while that of its origin is wholly so. It is supposed by some to be

The "Papyros
Ebers."

* Montaigne: *Essais*, Livre II, Cap. XXXVII.

† Egypt in the time of Herodotus contained from eighteen to twenty thousand cities. Under the successors of Alexander it is said to have contained thirty thousand towns. (Baas.) There were so many physicians in Egypt that Homer declared, perhaps as an early instance of poetic license, they were all physicians.

‡ The statement by Von Klein (*Journ. Amer. Med. Association*, December 18, 1886), that Cyrus, the Persian King, sent to Egypt for a rhinologist to relieve him of a nasal polypus, is not to be found in Herodotus, Xenophon or Strabo, nor in any modern work on antiquities of Ancient Egypt at my disposal, although I have not only carefully searched his references, but many others, modern and ancient, for a record of the fact. Since in quoting Herodotus he adds "nose" after "head" to the historians' category of special fields of medical practice and states that the most skillful operators were those who learned anatomy by practice in pulling the brain out of the nose in the process of embalming, he seems to have possessed sources of information in our time not accessible to Herodotus in his, as to Egyptian medicine. It is misleading, however, and embarrassing to other historians to insert such information in what is apparently a quotation. Cyrus sent for an eye doctor out of Egypt (Herod. III, 1) and Darius (Ibid. III, 129) made use of one of his captives, the Greek physician Democedes, to cure him of a sprain, but there is no mention of a nose doctor which I can find. Democedes, by the way, was the first physician of whose life and adventures we have a trustworthy record, and his romantic and interesting story is graphically told by the Father of History. He lived 490-430 years before Christ, and was paid fabulous prices for his services not only by the Persian King but by his countrymen.

§ Moses brought Israel out of Egypt 1300 years before Christ, and hence, according to these computations, 250 years after the compilation of the "Papyros Ebers."

merely a book on pharmacology, but as its learned translator* has stated, it is more than that, for near the end it deals with anatomy, physiology, pathology and surgery. In spite of the practice of embalming, anatomy was evidently largely a matter of fancy with these early doctors, and gave no promise of the great development which the Greeks under the Ptolomies, in the future city of Alexandria, a thousand years later, were to bring about in it. We read, page 181, "There are four vessels in both nostrils of which two carry blood and two carry mucus." In physiology they were scarcely less at sea, for when the air once entered the nose they lost track of it. "It goes to the heart and the rectum," says the author of the "Papyros," a few lines further on. It is evident that tumors of the neck, both tubercular glands and goitre, were well known and as little understood. It must be remembered, however, that the translation is often uncertain and that it is impossible for us to comprehend exactly what they meant even when the equivalents of their hieroglyphics are selected in the modern languages. "If thou findest in his throat a fatty tumor (?) and it appears like an abscess of the flesh, which can be reached by the fingers, thou must say thereto, 'he has a fatty tumor in his throat; I will treat the disease with a knife, taking care of the (blood) vessels.'" They were apparently very chary of surgical procedures, and even in this place it is uncertain from the translation whether the author does not really give preference to ointments and cataplasms, for which he gives a number of scarcely recognizable prescriptions.

We will find in the "Zend Avesta" that the surgeon must first thrice essay his skill upon a slave or a lower caste of man before operating on their betters. Let us think of our hospitals and dispensaries and refrain from unkind criticism. If they neglected to do this they operated at the peril of their lives on the high caste man. Such a penalty was calculated to encourage conservatism if it obtained in old Egypt as well as in Chaldea.

CHALDEAN MEDICINE.

Closely allied with Egyptian civilization was that of the Chaldeans and the Assyrians, but scarcely any notice has come down to us of their medical attainments beyond the records of magic,¹ †

* Dr. Med. H. Joachim, Berlin, 1890.

† Some one paraphrasing Pliny has said: "Magic was the offspring of medicine, and after having fortified itself with the shield of Astrology it borrowed all its splendor and authority from religion." See Pliny: Hist. Nat. Lib., XXX, Cap. 1—2.

the incantations and the invocations of good and evil spirits, which would indicate that our art among them was about on a level with that of the American Indians. In the satires of Juvenal we find Chaldean magic much cultivated by the decadent social world of Rome against which he aimed his shafts.

“Chaldeis sed major erit fiducia; quicquid
Dixerat astrologus, credent a fonte relatum
Hammonis.” (VI. 552.)

In the popularity of theosophy and the mind cure and the faith cure we have in our day a parallel to the condition at Rome so far as the mystic influences of the Far East are concerned.

It is impossible for us to stretch our credulity to the point of believing Herodotus when he asserts that the Babylonians had no physicians, but depended on the wisdom of the market place, where the patients were exposed for the benefit of the comments of passers-by. Familiarity with human nature compels us to believe that even if they possessed no medical knowledge they must have possessed men who pretended to it, and others who believed in their assertions, for as Celsus remarked, “*Medicina nusquam non est.*”

According to Sayce (Hibbert Lectures, 1887, P. 84,) dog's flesh and the ordure of animals were among Chaldean medicaments, and such things we find in abundance in the “Papyros Ebers.” These disgusting drugs we will again find recommended in the works of Galen, Ætius and Oribasius, among those prescribed internally and even for internal local applications in throat disease. We can perhaps therefore understand Juvenal's objections to the Chaldeans, and we may see from his mention how these articles crept into the later medical writings of the Roman Empire and subsequently appeared among the drugs of the Middle Ages, thus transferred from the plains of Mesopotamia to the banks of the Rhine and the Thames. The belief in the efficacy of precious stones as medicaments is first found in the accounts of Babylonian medicine and existed far into the Renaissance as costly articles of the Pharmacopœia.

Mysterious invocations, gruesome and disgusting prescriptions occupy a prominent place in all records of primitive medicine, but apparently these with the cabalistic use of figures and signs have long lingered in the records of medicine and in literature as the

Witch Medicine.

heirlooms of Chaldean sorcery. The Faust legend* is full of them. The Walpurgisnacht in Goethe's "Faust" has a distinctly Chaldean flavor, not pleasant but weird. We recall the dark cave in "Macbeth," where the witches' prescription is compounded:

"Fillet of a fenny snake
In the cauldron boil and bake;
Eye of newt and toe of frog,
Wool of bat and tongue of dog,
Adder's fork and blind worm's sting,
Lizard's leg and owlet's wing."

The same Chaldean prescription is found in Horace, where the foul witch Canidea orders:

"Et uncta turpis ova ranæ sanguine
Plumamque nocturnæ strigis,
Herbasque quas Iolcos atque Hiberia
Mittit venenorum ferax,
Et ossa ab ore rapta jejunæ canis
Flammis aduri Colchicis."

—HORATII FLACCI EPODON, Liber 5, V. 19 Seq.

These are merely Babylonian or Egyptian prescriptions in meter.

The Therapy
of the Magi.

Pliny (Hist. Nat. Lib. XXX), who believed that he would be able to include all the wisdom of the world in his histories, has left behind him some curious information as to therapeutics derived from Chaldean or Oriental sources. He may be held up as a terrible example to the gentlemen who still believe that even now the whole field of medical science does not offer too wide a scope for their mental powers. "I find," says he, "that a cold is checked if any one will kiss the nostrils of a mule." "Inflammation of the fauces and the pain will be cured by the dung of kids before they have tasted grass, if it is dried in the shade." "Gargling with the milk of a sheep helps the tonsils and fauces." "Anginas are helped by a goose's gall mixed with elaterium and honey—by the brain of an owl, by the ashes of a swallow soaked in hot water. Ovid is the author of this medicament." These suggestions are taken at random and do not exhaust the supply of therapeutical measures for nose and throat diseases, which were derived from the Magi by Pliny, to whom I would respectfully refer those curious in regard to or desirous of profiting by such

* "Faust in der Geschichte und Tradition." Kieseewetter, Leipsic, 1893.

garnered wisdom. Such things still are to be found in the folk-medicine of rural communities to a surprising extent. These relics of this peculiar phase of medical history are still with us, but we have but little direct knowledge of Chaldean medicine, although Sayce has lately partly deciphered "An Ancient Babylonian Work of Medicine."^{*}

For some mysterious reason Egyptian civilization, and with it Egyptian medicine, was at a standstill for many centuries before the downfall of the Oriental dynasties. At a later period we see the same phenomenon among the Hindus. Although the Greeks apparently derived at least the foundation of their learning from these sources, they were far in advance of them when the generals of Alexander (330 B. C.) established his empire over Asia. Even in the time of Xenophon (401 B. C.), two generations earlier, the Persian monarchs were surrounded by Greek physicians whom they brought to their courts, usually by profuse pecuniary inducements, but not infrequently by force and by kidnapping. It was Ctesias, a Greek physician and historian, who treated the wound, and is said to have saved the life of Artaxerxes when he was left for dead by many of his native followers on the battlefield of Cunaxa, where he so nearly lost his crown to his brother, Cyrus the Younger, who was subsequently himself killed in this battle.[†] Now, more than a hundred years before this we have seen that Cyrus the Great (559-529 B. C.) sent to Egypt for a physician for the eyes, while Darius (521-486 B. C.), one of his immediate successors, made use of Democedes, the Greek, in preference to native and Egyptian court physicians.

I do not know whether this sequence of historical events in medicine has any great value, but, in connection with other facts, it is perhaps significant of the shifting of medical knowledge.

THE MEDICINE OF THE PARSEES.

If we have not already had sufficient glimpses of Chaldean and Assyrian medicine we have only to glance through the "Zend-Avesta,"[‡] the Sacred book of the Parsees, to understand the reluctance of their monarchs to avail themselves of home talent. The remedies of the ancient Parsees consisted chiefly of charms and spells. They divided medical practitioners into three groups: Those who healed with the knife, those who used herbs, and those

^{*} "Zeitschrift für Keilschriftforschung," II, 1-3.

[†] Xenophon: "Anabasis I," VIII, 27. Plutarch: "Life of Artaxerxes."

[‡] Darmstetter: "Sacred Books of the East," Vol. IV, Part I.

who practiced spells and incantations, and the "Zend-Avesta" recommends the latter class, not an anomalous proceeding in ecclesiastical advice of later time as well, but it gives, perhaps, a very good reason, viz.: They were apparently the least to be feared. We learn that one of their evil deities created 99,999 diseases with which to plague mankind. Out of this large number we find no mention of those of the upper-air passages, nor of any other differentiation that is intelligible to us.

THE MEDICINE OF THE "TALMUD."

There are a number of modern treatises upon the medical knowledge of the "Talmud," but a perusal of them, while it reveals a perhaps interesting state of early Hebrew sanitary science, does not give us much insight into their knowledge of diseases of the nose and throat. There are several references* to acute inflammations of the throat which seem to bespeak the existence among the Babylonian Jews of diphtheria, or of that disease described later by Aretaeus as Syriac ulcer, from which "they died the most terrible death of all" the 903 deaths possible. This passage reminds one of the mention of the number of diseases in the "Zend-Avesta." We are still further reminded of Chaldean medicine by the incantations spoken of as therapeutic measures, of demons as etiological factors in fatal throat inflammations, and of the dung of a white dog mixed with myrrh as a local throat application in cases of coryza. Cynanche and "tumor of the palate" (apparently quinsy) are also mentioned.

In the *Mischna*† (Fol. 42) we learn that transverse division of the trachea is fatal, but (Holin, Fol. 45) that longitudinal section is not, if there remains an unsevered portion at the top and bottom. In the "Ghemara" (Holin, Fol. 57) it is stated that a hole in the trachea may be stopped by an artificial contrivance. It appears that they learned these facts from their sacrificial practice on animals. In the "Kethubot" treatise occurs this passage: "Samuel says that the polyp shows itself by a bad smell of the nose. A 'beraitha' says the odor comes from the mouth." Evidently Samuel and the "beraitha" meant ozena, although in a footnote the translator seems to think otherwise.‡

* "Die Medizin der Talmudisten," Bergel, 1885, pp. 33, 37, 42, 51.

† "La Medizin du Talmud." Rabinowitz.

‡ Being entirely ignorant of Hebrew and Sanskrit I have had to rely on the authority of translations which have been sharply criticised, but I have taken some pains to verify the above extracts from the "Talmud." The Jews are said, I know not on what authority, to have been ignorant of medicine until their introduction into Egypt.

HINDOO MEDICINE.

When we begin to search the writings of the ancient Hindus we enter a mysterious realm full of surprises, finding therein many medical facts which seem to belong to a later period of the evolution of the art. Finding these at a date many centuries before the beginning of the records of the Greeks vouches by itself for the remoteness of the beginning of Hindu civilization. That their writings are, some of them, of immense antiquity seems evident, and that they are the origin of much which is to be found in the later scientific literature of the Greeks seems very probable, for it is unreasonable to suppose that Greek civilization was as indigenous as they claimed both for it and for their race. Whatever was the origin of the Hellenic tribes, it is becoming yearly more evident with the advance in archæological knowledge that their learning was transplanted at a comparatively high state of development from the land of the lotus flower, and in all probability from that mysterious tableland of Central Asia, the roof of the world, through the peoples which dwelt along the Ganges and the Euphrates to the shores of the *Ægean*; but while at its source scientific knowledge seems to have stood still in historical times, it has blossomed in other soil to the fruition we now enjoy. It may be conjectured that the reason for this non-progressive character of the knowledge of the Oriental lies in racial characteristics, and yet it is difficult from our ignorance of their history to understand why this halt in the evolution of their knowledge should have occurred after it had grown to the proportions we recognize in the "*Susruta*."*The contention of Haas † a German critic, that the writings of the Hindus show that they have never been a progressive race, but that they had borrowed their knowledge from the Greeks without developing it, is plausible when we consider how eagerly the Persian monarchs sought medical aid from that source rather than from the East. The Hindus, however, were further removed from the Persian monarchs than were the Greek cities of Asia Minor, which indeed formed a part of their empire. Perhaps the strongest argument against this assumption is the fact that the same non-progressiveness is seen in Egyptian civilization, and yet the "*Papyrus Ebers*"

* Guizot and Freeman both ascribe the stationary condition of Eastern civilization to the unison of the temporal and spiritual powers, but this scarcely satisfies us, and while admitting the strong probability of the efficiency of this factor, we instinctively look for other causes concomitant and anterior to it.

† Haas: "*Zeitschrift der Deutschen Morgenländische Gesellschaft*," Vol. XXX, P. 617; Vol. XXXI, P. 647.

and other evidences prove that a comparatively high state of medical knowledge existed in Egypt at a period even anterior to the date assigned by the Greeks to the Trojan war, and at least many hundred years before the birth of Hippocrates. "Herodotus' Histories" are sufficient evidence on this score. Nevertheless Haas attempts to show that the medical writings of the Hindus are of recent origin, in fact that they were composed at a period subsequent to that in which the various Hippocratic treatises were given to the world. He goes still further and asserts that in all probability the "Susruta" is really a derivative of the Hippocratic system, and even that the name "Susruta" is a Hindu corruption of Hippocrates. It is supposed by him that the Hippocratic writings were rapidly disseminated through Asia and India by the Greek physicians, who were in such demand at the courts of the Eastern kings, but in the accounts of Alexander's campaigns will be found notices of Oriental physicians who possessed such knowledge of various parts of physic as were unknown to the army doctors, especially in regard to the cures for the bites of venomous serpents, which is perhaps not very conclusive evidence of a more extensive knowledge. Nevertheless in reading the "Susruta" and the "Charaka" one will be much impressed by some striking analogies to passages in some of the Hippocratic books which seem not to have been transmitted through generations, but to have been directly transferred from one treatise with very little modification to the other. Which was the original in nowise appears. It is scarcely necessary to say that Haas' arguments have not been generally accepted as convincing.

At any rate, since the dawn of history, western medical knowledge blown on the wings of the wind from European lands has scarcely produced a ripple on the stagnant pool of Hindu medicine, and to-day the two systems in India are practiced side by side.

The Hindu "Ayurvedas," just as the medical knowledge of all ancient peoples, were supposed to be of divine origin. Even in modern times the Christian Scientists and their ilk remind us of this tendency. The "Ayurveda of Susruta" was revealed by D'hantavare, the physician of the gods, out of compassion for the suffering of mortal men. These medical vedas or axioms were collected and transcribed by his disciple Susruta. The "Ayurveda of Susruta" is said by the wise men of the East to be at least of a date 1000 years B.C., and it contains scraps of medical lore which bear

every evidence of being still more ancient. Time being of little value to the dreamy Hindu, his chronology is a source of inexhaustible irritation to the uneasy Western savage. Although we of another civilization have good reason for tracing our philological, our scientific and philosophical, even our ethnical origin, back to this cradle of antiquity, we have traveled a long distance since then on all these highways, and not only is the language obscure, but the ideas are many of them unintelligible to us in their old books. Therefore, although the "Susruta" is admirably arranged in captions much in accord with modern medical ideas, the Latin translation of Hessler (1844) is in many places confusing, and it is perfectly evident that the translator is often himself groping in the dark.

There are to be found in the "Susruta," and easily referred to in Hessler's rendering, many references to the diseases of the nose and throat, some of them recognizable by our barbaric Western intellect, but many of them to us quite vague.

The "Charaka Samhita" is being translated from Sanskrit into English by Avinash Chandra Kavaratna, a learned pundit of Calcutta. This work is said by the Hindus to be a revelation of Indra, the god of the middle air, through Charaka the sage, and is said to be of much more ancient origin than the compilation of "Susruta." At least it is more unintelligible to the modern student of medical history. To the student of philology it is said by Wise and Müller, and Eastern scholars generally, to be of greater value than the "Susruta," and the learned and enthusiastic translator, a patriotic Hindu, indulges in the fond hope that by the diffusion of the wisdom of Charaka a profound impression may be made upon the practice of the medical art as pursued by the energetic sons of the West, the physicians of Europe and America. I am afraid our Hindu confrère does not realize the obduracy of the seed of Japhet.

"Charaka-Samhita."

Both in the "Susruta" and in the "Charaka" the declaration is made, and this is found very little modified in the medical works of the Greeks, that "Wind, bile, phlegm have been said to be the cause of all bodily diseases." What follows, however, I have not noted among the writings of the Greeks. It is a little too mystic for them, apparently. "The qualities of passion and darkness have again been indicated to be the causes of mental diseases."—("Charaka.")

In "Susruta" we learn* that there are sixty-four diseases of the

* Hessler: "Pathologia," Chap. XVI, P. 202

mouth in seven situations. The seats of morbid action are the lips (8 diseases), roots of the teeth (15), the teeth (8), the palate (9), the fauces (17) and all of them together (3).*

As one of the diseases of the palate we recognize quinsy in Hessler's Latin: "Tumor rigidus, in palati regione a sanguine ortus existit. Cognoscendus est hic morbus angina, febre dives." There are various passages translated by Hessler which Morell McKenzie supposes to refer to diphtheria, but I doubt if we can differentiate the different forms of acute throat inflammation, accounts of which are found here, as elsewhere, in all extensive treatises of the ancients on disease, it matters not to what age or people they belong.

One can not but be struck by the early tendency of the medical man to lay great stress and emphasis on a name. We have seen how the physician of Egypt was to announce the presence of a "fatty tumor in the neck," and here in the "Susruta" the rendering is: "Qui tumor in linguæ dorso magnus est, is intumescencia vocatur." We may readily imagine that these venerable doctors of the hoary past made use of some recondite word of a language still older than their own, if any such there were, to express in suitably dignified terms for the edification of the laity a diagnosis which was really only a definition, "Un specieux babil, qui vous donne des mots pour des raisons," as Moliere† puts it 2500 years later.

Here and there we can recognize familiar surgical operations. "By means of forceps between thumb and finger, drawing the uvula forward, the physician may cut it with a sickle-shaped knife above the top of the tongue." "Gilagum (quinsy ?), so called, may be cured by the knife." Firm, hard and filling the fauces, extraordinarily swollen with sprouting flesh, giving rise to much

* The statement is made by Galen—"Galen in Hippocratis Librum de Alimento Commentarius," III, XXVI, Vol. XV, P. 363 (Kuehn)—that the school of Cnidos, the rival of that of Cos, divided diseases into a great number of different kinds: "Seven diseases of the bile, twelve diseases of the bladder, four diseases of the kidneys," etc.

If we consult the ideas and the philosophy of Pythagoras (500 B. C.), which had a profound effect upon Greek civilization and had a great influence at the school of Cnidos, we will find in them traces of much which he derived, evidently, from his long travels and his diligent studies pursued among the Oriental nations with which Greek tradition credits him. Now this reverence for numbers we find in the "Charaka" and "Susruta," and we have already noted it in the "Zend-Avesta" and in the "Talmud" in connection with diseases. It is by many little hints such as this that we are able to trace the connection of Greek medicine with that of the Orientals, and we may also note how the latter have purified and exalted it, not only by their initiative, but by the dropping of the superstitions with which it was overgrown. There is very little of spells and incantations, and reverence for numbers and malignant demons, to be found in the Hippocratic writings.

† "Malade Imaginaire."

pain, caused by the evil inflammation of the humors, killing almost a hundred men, it is recognized that (this ?) swelling of the tonsils is incurable; but a tumor seen in the throat about the size of the seed of the *Phyllanthus Emblica*, stationary, a little painful, made up of phlegm and blood, adherent like the fruit of the *Terminalia Alata*, this, curable by the knife, is called *Gilagu*." Are we here to recognize a differentiation of malignant and benign swelling of the tonsils and the prevalence of the practice of tonsillotomy?

Wise, in his "Hindu System of Medicine," describes a method of abscission of the tonsils which aimed at removing a third part only with the knife. "If all is cut the patient will die of hemorrhage." As he does not give his reference I am uncertain if this is contained in the more ancient books or not. Many more recent writers have insisted that a partial excision only is ever indicated, and is sufficient. We may be sure from these passages that they knew what secondary tonsillar hemorrhage meant as well as some of the rest of us.

It is especially in the Hindu writings that we find such complete and minute accounts of the various plastic operations about the nose. This was due, doubtless, to the practice of the wrathful Oriental potentates who amputated the nose out of revenge or in the exercise of judicial penalties. This art was almost entirely forgotten by the Greeks, because they shrank in horror from the mutilation of the human form, and had little opportunity to practice plastic operations for its correction. In a more savage age and country, many centuries later, it was revived by Tagliacozzi, but we shall easily trace it back to its Oriental source. Rhinoplasty.

Vaporization and fumigation through a tube were frequently employed in the diseases of the nose and throat. Stimulating and acrid vapors seem to have been recommended in what we may conjecture was *ozena*.* It was also prescribed for coughs, asthma, hoarseness, mucus discharges and enlargement of the tonsils, but as it was also advised for "morbid baldness and a reddish yellowness of the hair,"† one is left in some doubt as to its *modus operandi*. These diseases were all due, according to the sage, to the same cause. Local applications of ointments were made to the nostrils and various sternutatories were used for cleansing the nasal chambers, after which, apparently in *coryza*, the following directions were explicit, and could be only slightly improved by

* "Susruta." *Therapia*, Cap. XXII-XL. (Hessler.)

† "Charaka." (Trans. by Kavaratna.)

the modern rhinologist: The patient was to lie on his back, raise the tip of his nose with his index finger and allow his physician to drop in his nostrils warm oleaginous liquids. While this was being done he was not to become angry, nor speak, nor laugh, nor swallow the oil dripping from his nose, but spit it out. The use of sternutatories or snuffs was also recommended for sleeplessness and clearing the head in the morning—apparently prescribed for conditions in which we order douches and sprays. Gargles were also a part of their therapeutical resources. They very often used oil as a menstrum, and apparently had a more thorough way of using the gargle than we usually insist upon.* It is evident that these old Hindus recognized the dependence of laryngeal on nasal diseases, as is apparent in this sentence in Hessler's translation: "*Nasale remedium morbos hominum supra claviculam ortos refrenat et organa sensuum pura atque os suaveoleus efficere potest.*"

In the light of recent sanitary doctrines and regulations the following quotation from Charaka (P. 74) may be of interest: "One should not eject the mucus or phlegm of one's nose in a place that is crowded." This, however, may have been only a precept of social intercourse rather than having the additional sanitary weight it now possesses. At this place occurs rather frank advice as to the relations between man and wife. They are amusing, but perhaps a little out of place now in print when not attended by the strict scientific necessity for their publication. The one precept which may be quoted here is as applicable to laryngologists and rhinologists as it is to the rest of mankind. It is to the effect that a man should make a confidante of his wife, but he should not tell her all his secrets. These little scraps from the dim and misty past of a forgotten civilization make one realize the universal brotherhood of man. In fact, one cannot even glance through the works of Charaka, and especially of Susruta, without having one's mind impressed with the antiquity of human knowledge and wisdom, and it is a vast education for any man when he can be brought to realize, in this egotistical epoch, how little of it after all has had its origin in his day and generation.

We can only conjecture that the development of the arts and sciences of the ancient Oriental world must have occurred chiefly in some prehistoric cycle of human activity, when man's mind and body were as free along the Ganges as they were on the shore of

* "*Susruta.*" Tomus, III, p. 42. (Hessler.)

the Ægean when the Hellenic tribes took up the torch, in the blazing light of which we still live. This is what liberty means, and we can now see along the Ganges and on the Ægean the results of the mental and political slavery not only of an Oriental, but of a once glorious Occidental race.

In Wise's work on "Hindu Medicine," from which I now quote, there are many accounts of nose and throat diseases which I can not find or have inadvertently passed over in the translations of the "Charaka" and of the "Susruta" at my disposal. As he states that his work is taken exclusively from the ancient Hindu writings, although in the passages cited he does not indicate the sources from which he draws his information, it may be inferred that they are of equal antiquity with those I have drawn directly from the translations of Hessler and Kavaratna. Moreover, I recognize in Wise's book many passages identical with those in the "Charaka" and "Susruta."

Medicines administered by fumigation through the nostrils were used not only for local nasal diseases, but for some general affections, and particular directions are given for using them. Among the errhines or sternutatories to clear the head may be noted pepper, mustard, orris, ginger, asafetida. One might think they would be efficient. One of the methods recommended for causing sneezing was to look at the sun so that its rays would fall on the mucous membrane of the nostrils. We recognize here an error in mistaking a reflex phenomenon of the retina for a direct action.

Among the gargles, besides the more agreeable ones of oil, vinegar, honey and the juices of fruits, the urine of cows finds a place. Stimulating and irritating substances (pepper) were also prescribed as gargles. There is an instrument spoken of (P. 169) for "eradicating nasal polypi; a frequent and troublesome disease in many parts of Hindustan." It seems to have been some sort of a curette.

(P. 186.) If a foreign body is 'in the throat, the extraneous matter may be discharged by thrusting down a hot iron to dissolve it, or soften it, and so remove it. In such case the hot iron is passed through a metallic tube. A probang for removing fish bones is usual; by drinking fluids and emetics it is also dislodged; this may also be done by beating the patient upon the back of the neck." Among the fifteen modes of removing extraneous substances, *Bidmapana* is "by blowing, as a substance introduced into the larynx, which produces great irritation and strong efforts

Foreign
Bodies.

at coughing," etc. *Pramarsa*: "If in the nostrils errhines are to be used." It must be confessed that the art of removing foreign bodies from the upper air passages does not seem to have been very highly developed, and the above described use of the hot iron seems strange and hardly credible. Is it possible that we have here a confused Hindu rendering of the recommendation by Hippocrates for the use of the hot iron in the nose?*

Fracture of the
Nose.

Again we are reminded of Hippocrates in the passage (Wise, P. 192): "When the bones of the nose are depressed they are to be raised into their natural position by means of an instrument called *Shalaka*: a hollow wooden tube is kept in the nostrils so as to retain the bones in their natural position."† We may note another passage, and this is especially dwelt on by Haas (*l. c.*) as indicative of the corrupt and degenerate derivation of Hindu medicine from the Greeks. There is probably no quotation from Hippocrates so well known as that in which he describes the facies of approaching death (Prognostics 2): "A sharp nose, hollow eyes, collapsed temples; the ears cold, contracted, and their lobes turned out; the skin about the forehead being rough, distended and parched; the color of the whole face being green, black, livid or lead-colored." Now compare this with Wise's translation from the "Susruta": "When it (the nose) becomes pale, dry and shining, and is turned to one side; the nostrils extended, dry and dirty, and the passage of the air produces a noise; or when the point of the nose retracts and is flattened with weakness and depression, the person will soon die." We note how distinctly inferior this is to the graphic description of the Greek sage. I doubt very much the conclusiveness of even the suggestiveness of the passage in the "Susruta" as an argument for the derivation of Hindu from Greek medicine. Similar phenomena were observed by men of dissimilar mental powers.

There are thirty-one diseases of the nose. Simple catarrh, acute and chronic, was called *Pinasa*. *Ozena* is *Putinaska*. Nasal polypi were termed *Nâsârsah* and there were four kinds. Tumors of the nostrils are of five kinds and were called *Nâsârbuda*, but it does not appear how they were distinguished from the nasal polypi (Wise, P. 289). Goitre, tumors of the neck, scrofulous swellings, hoarseness, asthma, cough, are all described, but there is little in the passages which is either interesting or

* Diseases II, where much else resembles the "Susruta."

† Vid. "Susruta." Hessler: *Tomus*, II, P. 67.

instructive. We may pass lightly over the Hindu conception of anatomy and physiology. As an indication of its limitations, Wise, in his "History of Medicine among the Asiatics" (Vol. I, P. 135), among other examples of their ignorance, declares that the Hindus had but one name for throat, "Khunt," including in its signification not only the air-way but the gullet.

PRAE-HIPPOCRATIC MEDICINE IN GREECE.

Whatever may have been the truth as to the derivation of Hindu medicine, we have little actual means of knowing whence the Greeks drew the germs of their medical knowledge. We may conjecture that it came with the Phœnician trading vessels from the shores of Asia, or the Hellenic tribes may have brought it from the Asiatic tablelands with them, but more probably much the larger portion of it came directly from the valley of the Nile when in 670 B. C. the land of the lotus flower was thrown open to Greek commerce and Greek curiosity. Thales and Pythagoras are significant personages in the early history of Greek science. In the fragments of their philosophy as well as in the legends of their lives we find unmistakable evidences of their sojourn among the Orientals and of their absorption of Oriental civilization and philosophy. The same may be said of Solon.

Perhaps it may be of some value to note that therapeutics in Greek medicine include none of the disgusting substances and scarcely any of the charms and invocations which mark so strongly that division of medicine among the Egyptians, Chaldeans, Hindus and Eastern races generally, and which we have seen later was introduced into the Greek medical writings of the Roman Empire and upon which I have already commented.

The period of four hundred or five hundred years which stretches from the supposed age of Homer to the birth of Hippocrates (460 B. C.) is one of which we know but little in the history of medicine. It is entirely devoid of medical works which have come down to us. In philosophy, Thales, Xenophanes and Pythagoras greatly influenced the minds of men in weaning them from the superstitions recorded in the "Theogony" of Hesiod. They winnowed out from them idealistic portions which could be made to stand as symbolical of their own ideas of cosmogony.* Coming down to the time of Socrates, we find him recognizing things divine and things material, while Hippocrates, but little his junior,

* Grote: "History of Greece," Vol. I, p. 368 f. f.

brings all phenomena under one head and calls them all divine, one not more than the other. (Airs, Places and Waters.) Whatever may have been the channels by which were carried the seeds of knowledge, the marvelous growth which sprang up on the soil of Greece has not ceased and will never cease to excite the wondering admiration of mankind. It is significant perhaps that the opening of Egypt to Greek commerce took place at about the time of the beginning of written records in Greece (660 B. C. Grote: "History of Greece," Vol. II, P. 149), and two hundred years after writing was first introduced and the epic ballads of the wandering bards and rhapsodists became perpetuated in written records we have the birth of the "Father of Medicine." It needs only a cursory perusal of the Hippocratic writings to realize how intense the mental activity of nascent Greek civilization must have been to have produced in the short period of two hundred years a condition which made possible the compilation of these masterpieces of medicine in whose inspiration we still live. After the excursions we have made into the more stagnant civilizations in the search for the origin of medical knowledge we feel that we are nearing home, or at least on more familiar ground, when we begin the study of Greek medical history. At the port of entry looms up, obscuring all others, the great name of Hippocrates. There was medical knowledge in Greece before the birth of Hippocrates, of course, but the records of it have perished and so have the works of those who followed him. It is only by scanning secular literature and by noting references in later medical writings that we are able to obtain some glimpses of the state of the knowledge of the anatomy and the functions, but scarcely of the diseases of the upper air passages. In the legends of the Hellenic races are to be found traces of familiarity with a medical art which existed long before the rise of the school which clustered around the altars of Æsculapius in the Isle of Cos. Hippocrates* traced his lineage in the seventeenth generation through a medical ancestry to that demigod, who according to Cicero (*De Natura Deorum* III, 22) was the son of Apollo or of Hermes, or of Arsippus and Arsinoe. He was the first to discover the probe, according to Greek legends, the first to bandage a wound, the first to teach men to draw teeth and to purge their bowels. For these and other services he was deified, but because he raised the dead and attempted to exercise his power of making men immortal he was

* Grote: "History of Greece," Vol. I, P. 182.

struck into Tartarus by the forked thunderbolt of the jealous Olympian Zeus. His two sons, Podaleirus and Machaon, led the thirty Thessalian ships to the siege of Troy ("Iliad," II, 731) where they exercised their father's art as well as that of Mars. Machaon was said* to be skilled in the arts of the surgeon, while Podaleirus had "skill over things invisible," and to the latter was given precedence, a custom still prevailing in medicine to-day. It is to Machaon, who knew how to draw out darts, to make incisions, and to treat wounds and ulcers, that the present generation of rhinologists owe homage rather than to Podaleirus, who diagnosed madness in the blazing eyes of Ajax.

We can do little more in this period of medical history than seek out the origin of the nomenclature of the parts of the human anatomy with which we are concerned. We have seen that the word nose is apparently contemporaneous in origin with that of the Aryan languages. While we have the authority of Daremberg † for the statement that there are only five instances mentioned in Homer's "Iliad" of wounds of the throat, there are a large number of lines in which the nose is mentioned. We read ("Iliad," V. 291) how Athene directed the lance of Diomedes so that it pierced the nose of Pandarus near the eyes, crashed past the white teeth and, cutting the tongue, appeared under the chin, and how the mortally wounded chieftain pitched headlong from his chariot. There is a line in the "Iliad" which gives evidence that embalming was understood by Homer's Greeks (XIX, 39).

The Nose and Throat in "Homer."

The goddess Thetis dropped nectar and ambrosia into the nostrils of the dead Patroclus to keep the skin hard and firm and thus preserve the body. This she does to allay the grief of her son Achilles at the death of his friend. As we know that embalming was foreign to later Greek customs we may perceive here a familiarity at least with Egyptian practices, if not an influence of Egyptian ideas, and to some extent the prevalence of oriental customs.

We have seen how indefinite was the Hindu word for throat. Although the Greeks, unlike the Hindus, had many words for this part of the anatomy, they used them at first very indefinitely and interchangeably. The word pharynx in early Greek literature was about as indefinite as our word throat. It occurs in Homer's "Odyssey" first. If you will turn to the graphic description of that horrible man-eating Cyclops, Polyphemus, in the ninth book, at line

Etymology of Greek Words for "Throat."

* Arktinus: (770 B. C.) "Epic. Graec. Fragm.," II, P. 22.

† "La Medicine dans Homere."

373, you will find the word there used in describing how, after eating a brace of Greeks and swilling barrels of wine, the bloody swinish giant fell over in drunken stupor on his back in the cave while wine and morsels of his cannibalistic feast regurgitated from his capacious pharynx ("Odyssey," IX, 373).

φάρυγος δ'έξεσσντο δινος ψωμοί τ'ανδρῶμεοι.

Whether this is the first written use of the word or not, it certainly occurs here in a most vividly striking passage of the greatest of poems by the first of poets. It will be seen that Homer has used the word here in accordance with its present significance, but in the "Odyssey again (XIX, 480)—Ulysses grasps with his right hand the *φάρνξ* (throat) of Euryclea to prevent her crying out. Even in the works of Hippocrates a similar looseness of meaning is to be observed, as, for instance, in the Littré edition (Vol. VIII, P. 565), where the translator renders the word as larynx. Galen, * however, in his comments on Hippocrates, declared that by the term pharynx the latter understood that region which is situated in front of the gullet and wind-pipe and which may be inspected by depressing the tongue.

The word larynx is not found in Homer, but is first noted among the dramatic poets; but here again quite indefinitely arousing our suspicion that *λάρνξ* may have been at first a corruption and a tautological use of the word *φάρνξ*. This may be seen by a reference to the plays of Aristophanes ("The Knights," I, 1363; "The Frogs," I, 575). In the "Cyclops of Euripidies" (I, 157) occurs the passage, *μὼν τοῦ λάρνγγα διεκάναξέ σου*, which the dictionary translates, "Has aught run gurgling through thy throat?" The thought arises from this quotation that the idea of the drink going into the larynx must have originally arisen from the resonance of the larynx and trachea transmitting the sound of the swallowed liquid from the esophagus. This might have been still further strengthened by the sight of the movements of the larynx in the act of deglutition. Hippocrates, however, will be found to use the word more correctly when referring to results of the division of the wind-pipe ("The Flesh," 18), and in the chapter ("Concerning the Nature of the Bones," 1) where he describes how the larynx goes to the lungs and thence to the top of the bladder, but even as late as Galen the two terms were occasionally used interchangeably. Aristotle also uses the word in its present signification and only rarely speaks of the wind-pipe, *i. e.*, the trachea,

* Ed. Kuehn, XVIII. B. P. 264.

as extending from the lungs to the mouth. Not until Galen, however, do we find the term definitely established by his anatomical descriptions.

Homer uses the word *Ασφάραγος* once in the "Iliad" (XXII, 328), as a similar but more indefinite term. The god-like Achilles, with the terrible spear, smote Hector in the throat, above the clavicles, where the neck starts from the shoulder, in order that there might be quick loss of life. "There the point went through the tender neck," but the *Ασφάραγος* was not cut, in order that the prostrate man might answer the victor's cruel taunts. It is clear, therefore, that Homer recognizes, by this term, the organ from which the voice issues. We may be allowed to conjecture, in the absence of any information to the contrary, that this term *Ασφάραγος* arose from the contemplation of the wind-pipe as it sprouted from the root of the lungs of the slaughtered sacrificial animals, whose entrails were examined by the priests in their religious ceremonies for prophetic indications. It must have appeared to them not unlike a thick stalk of the vegetable for which the word, in one of its two forms, was identical, according to the dictionary. From this may have come *φάρυγξ* and later *λάρυγξ*. This, however, is entirely conjectural on my part.*

Daremberg is of the opinion that Homer, and, of course, by Homer we mean the men of his day, knew that food and drink passed down the gullet. He refers to the "Iliad" (XXIV, 641, 642), but I am not satisfied that *λανκανίης*, the word employed, meant the esophagus. It seems to have been applied almost as loosely as the other Greek words for throat (Vid., etc., XXII, 325).

We will discuss later the interesting error of the ancients in regard to the destination of liquids when swallowed. It is well known, of course, that the word trachea arose from the subsequent use by Erasistratus (Sprengel) of that Greek adjective, meaning "rough," in connection with the artery (*αρτηρία τραχεία*) to signify that it belonged to the same class of structures as we now know to carry blood and not air. The artery part of the name was dropped when this error passed away and the trachea remained. *Βρόγχος* was a word also frequently applied to the whole wind-pipe, but later coming into use for the channels below the division of the trachea.

* While the root of the word pharynx is said to be the same as in *φέρω*—Latin *fero*—we may imagine it is true, without any proof to the contrary, that the word *aspharagos* arose as here stated.—Vid. Cent. Dict. and Greek Lexicon.

Finally, I quote from another brochure of Daremberg* the derivation of another term rhinologists use every day:

"Euripides (Fragm. 1044) is, I believe, the first author where one meets with Μυκτῆρ—the nostrils or the nose. It seems also that Sophocles (Fragm. 58), and especially Aristophanes (Fragm. 650), calls the nose or the nostrils by the name Μύξα, which is regularly applied to the mucus which escapes from them. ("The Knights," 910; "The Wasps," 1488).

Scientific and philosophical records being so defective, and purely medical treatises being entirely lost, if any existed before the Hippocratic era in Greece, we can not hope to glean much in regard to our subject from this period. Nevertheless some faint reflections may be found in the works of the later writers.

Early Greek
Superstition.

Here is a fragment suggestive of the character of early Greek medicine, showing that it differed little from that of other rude and uncivilized races. The Dog and the Serpent were alike sacred to Æsculapius, and on the second one of the columns, seen by Pausanias at Epidaurus, this record has been found engraved among others of medical interest, testifying to the efficacy of the holy dogs kept at the shrines. A child of Egina, "affected with a tumor of the neck, applied to the god. One of the sacred dogs licked the affected part and cured it."†

Philosophy has always at all epochs of Medicine dominated it. Pythagoras established four elements: Earth, Fire, Air and Water—Empedocles admits these, but adds to them their qualities: the cold and hot, the wet and dry, which are found in medicine until the Renaissance.

In Plutarch's "Morals"‡ there are to be found some curious chapters on the senses, and he there quotes from many of the old Greek philosophers who lived before the time of Hippocrates and whose writings were apparently extant in the time of Plutarch (46 A. D.). The chapters on smell and taste are of interest to us here.

"Alcmaeon (B. 520 B. C.) believes that the principal part of the soul, residing in the brain, draws to itself odors by respiration. Empedocles (B. 490 B. C.), that scents insert themselves into the

* "L'Etat de la Medecine entre Homère et Hippocrate."

† Reinach: "Revue Archeologique," 1884, II, P. 129; 1885, I, P. 267. For a most interesting account of the Temple of Æsculapius at Epidaurus, see a paper by W. S. Coleman, M.D. F.R.C.P., St. Thomas Hospital Reports, Vol. XXVII, 1898.

For a very readable account of the cult at Epidaurus, see "The Temples and Rituals of Asklepios," by Richard Caton, M.D., etc., 1900.

‡ Translation. Ed. Goodwin, 1870, Vol. III, P. 170 (De Placitis Philos.).

breathing of the lung; for when there is great difficulty in breathing, odors are not perceived by reason of the sharpness; and this we experience in those who have the defluxion of Rheum."

"Alcmaeon says that a moist warmth in the tongue, joined with the softness of it, gives difference of taste. Diogenes,* that by the softness and sponginess of the tongue, and because the veins of the body are joined in it, tastes are diffused by the tongue; for they are attracted from it to that sense and to the commanding part of the soul, as from a sponge."

Alcmaeon is said to have been the first Greek anatomist and to have dissected the eyes and ears of animals, discovering the optic nerve and the Eustachian canal, thus antedating in the latter discovery Eustachius by many centuries. Aristotle (*Hist. Animal* I, IX, 1) comments on a mistake of Alcmaeon in supposing that goats breathed through their ears. It is singular that this error should crop out so late as the seventeenth century A. D., but Tulpus may be found† asserting, in spite of Aristotle, that on account of this anatomical configuration, as described by Alcmaeon, it is possible in labored inspiration for air to find this auxiliary passage to the lungs.

The Eustachian Tube.

Alcmaeon explained hearing by the hollow bone behind the ear—"for all hollow things are sonorous." (Plutarch l. c.)‡

Empedocles discovered the labyrinth of the ear and explained sound by the impress of air upon it as upon a drum. In one of the fragments preserved from the "*Carmina of Empedocles*,"§ we read: "Thus they breathe out and in. Bloodless tubes extend through all the flesh throughout the whole body, and the end of these placed within the nostrils is perforated by large openings leading to the cavities (cerebral?) so that they may hold back the blood and open free passage for the air through the meatus." This perhaps would suffice to illustrate the confusion in regard to anatomy which existed among the best informed of those philosophers older than Hippocrates, but I may perhaps be allowed to add an embryological idea which Sprengel has found among the fragments of verses of Empedocles: "He attributed the forma-

* I presume Plutarch here refers to Diogenes of Apollonia, born in the fifth century B. C., who described the distribution of the blood vessels, which is to be found in the fragment of his writings still preserved. "*Fragm. Philosoph. Graec. Mullach*," Vol. I, P. 254.

† *Observat. Med.*, 1641, Lib. I, Cap. XXXV.

‡ See also Kuehn: "*Opuscula Minora*," I, P. 69.

§ "*Fragm. Philosoph. Graec.*" Mullach, 1875, 2d Vol. I, 343 f. f.

tion of the abdominal cavity and that of the intestines to the sudden and rapid passage of water through the body at the moment of its formation, and the external openings of the nose to a current of air which was established from the interior to the exterior."

Diogenes of Apollonia (500-400 B.C.) explained the superior intelligence of men by supposing they breathed a purer air than the beasts which carry their noses near the ground. (Draper.)

Democritus is said to have been born at Abdera in the same year (460 B.C.) and to have been greatly admired by Hippocrates, who reproved the countrymen of Democritus for having supposed him insane and for sending for him to cure him. He is said to have derived his atomic theory from Leucippus (B. 500 B.C.) He is quoted by Plutarch (l. c.) in regard to the voice as saying that "the air is broken into bodies of similar configuration and these are rolled up and down with the fragments of the voice." This statement seems, of course, rather fantastical and we might suspect Plutarch had confused a more intelligible passage from Democritus did we not find in one of the fragments* remaining to us from Democritus an analogous statement as to taste, the distinctions of which he attributed to the different shapes of his atoms. Plutarch continues: "The stoics say the air is not composed of small fragments, but is a continued body and nowhere admits a vacuum; and being struck with the breath, it is infinitely moved in waves and in right circles until it fills that air which invests it, as we see in a fish pool which we smite by a falling stone cast upon it; yet the air is moved spherically, the water orbicularly. Anaxagoras (B. 500 B.C.) says a voice is then formed, when upon a solid air the breath is incident, which being repercussed is carried to the ears; after the same manner the echo is produced." Out of much which is to us mere jargon, but which to them was perhaps full of meaning, it may be seen that we may occasionally extract passages which need little altering to conform with modern doctrine.†

* "Fragm. Philosoph. Graec." Mullach, 1875, Vol. II, P. 362.

† It is absolutely necessary for any one desiring an intelligent knowledge of the medical theories in the writings of Hippocrates and of all subsequent medical writers, that he should acquaint himself thoroughly with the material and psychic philosophy of the ancients. A very good résumé of the subject so far as it applies to medical doctrines may be found in the Preliminary Discourses attached to Adams' Sydenham edition of "The Genuine Works of Hippocrates," while Draper in his "Intellectual Development of Europe" gives a somewhat biased review of Greek philosophy in its broader ramifications. In the "Proemium of Celsus," however, will be found the most succinct and the clearest account of Medical Schools among the ancients.

THE HIPPOCRATIC TREATISES.

So completely have the records of Greek medicine before the time of Hippocrates perished, that he seems himself to have created it. It seems to have sprung from him and his associates, like Athene from the head of Zeus, or like the sudden growth of the infant Apollo after tasting of the ambrosial cup from the hand of Themis, to have started at once into the full life of a vigorous and fruitful manhood. We may be sure, however, from the cold analysis of historical experience and of philosophical logic that there must have been a long previous condition of growth and development, which can not be traced in the scanty remnants of history left us.

On the authority of Celsus (Lib. I. Proemium) we must accept Hippocrates as really the first medical specialist in our civilization, for he was the first to separate medicine from other sciences and devote himself exclusively to that branch of knowledge, for which, no doubt, as we may judge from reading Plato, he was regarded by other philosophers as lamentably narrow and one-sided. Reasoning from experiences of later ages, we may imagine that after a little time some philosophers, who thirsted after the reputation of progressiveness, acknowledged that this specialization might possibly be excusable, provided the heretic had first spent all the productive years of his youth in the pursuit of inquiry into the nature of the gods and the occult properties of the four cardinal elements, fire, earth, air and water. I can not forbear giving here Celsus' explanation of how it happened that philosophers took up the study of medicine at all, since it is somewhat amusing. He intimates that the old philosophers spent so much of their time in sedentary contemplation and nocturnal vigils that they fell sick, and were forced to resort to the study of medicine to cure themselves.*

The civilization of the Chaldean and the Parsee, of the Egyptian and even of the Hindu is strange and incomprehensible to us, but we instinctively feel that the Isles of Greece, that Cos, over opposite Abdera is a familiar land, and that there we will find a mental

Hippocrates as
a Specialist.

* "Ergo etiam post eos, de quibus retuli, nulli clari viri medicinam exercuerunt; donec majore studio literarum disciplina agitari coepit, quae, ut animo praecipue omnium necessaria, sic corpori inimica est. Primoque medendi scientiae sapientiae pars habebatur, ut et morborum curatio, et rerum naturae contemplatio sub iisdem auctoribus nata sit: scilicet iis hanc maxime requebantibus, qui corporum suorum robora quietae cogitatione, nocturnaque vigilia minuerant. Ideoque multos ex sapientiae professoribus peritos ejus fuisse accepimus; clarissimos vero ex iis Pythagoram, et Empedoclem, et Democritum. Hujus autem, ut quidam crediderunt, dicupulus Hippocrates Cous, primus quidem ex omnibus memoria dignus, ab studio sapientiae disciplinam hanc separavit, vir et arte et facundia insignis." It is needless to say that those acquainted with the writings of Celsus will recognize in this passage his bias towards the vital importance of bodily exercise in therapeutics.

activity into which we are able to enter. When we read in Xenophon's *Anabasis* (III 11 9) that the soldiers cried out when their comrade sneezed, "Ζεῦ σῶσον," "God save you," immediately comes to our mind the Frenchman's ejaculation "Dieu vous benisse," and the Germans' hail, "Gesundheit."* Turn to Hippocrates' account of the case "In Thasus, the wife of Dealces who was lodged on the plain"† and read there his account of a death from fever with cerebral symptoms. No such vivid impression is left on the mind by any other portrayal of the fatal march of a mortal disorder until we find Shakespeare describing in Dame Quickly's patois the death of Falstaff, who was "so shak'd of a burning quotidian tertian that it is most lamentable to behold," and how "at the turning o' the tide" she saw him "fumble with the sheets and play with flowers and smile on his fingers end," and noted that "his nose was sharp as a pen," how "a' babbled of green fields," and cried out, "God, God, God, three or four times," and "his feet were as cold as any stone." The wife of Dealces fumbled with the bed clothes and picked at the hairs on them and laughed and there was much talk and again she was silent. Adams (l. c. p. 196) supposed Shakespeare to have derived his description second hand from the celebrated passage in Hippocrates‡ as to the facies of death, but it seems to me that it bears a much closer resemblance to the description I have alluded to. I do not believe Shakespeare ever had any knowledge of either of these passages in the Hippocratic writings, either first hand or second hand. We are struck by the resemblance of the impressions made on our minds by the words of two masters in the description of similar objective phenomena. It is the stroke of the master artist, the touch of immortal genius which sprang as frequently from the soil of Greece in its Golden Age as it did from that of Britain at the zenith of her literary glory. Such objectivity is not to be found in the Orientals' dream of life. Do we find here an explanation, or part of an explanation, of why the civilization of the Orient, of the Ganges and of the Nile has stood still for 3000 years and can not now be aroused from the slumber of so many centuries? At least we can comprehend somewhat from this objectivity how the virile fructifying aggressive mind of the

* This ancient custom, however, is older than the Greek civilization.

† Epidemics III Sec. 17, case XV. Adams Syd. Edition *Genuine Works of Hippocrates* All reference to the Hippocratic treatises are to the Littré edition unless otherwise, as here noted.

‡ Prognostics 2, Adams.

Ancient Greek furnished a soil for the quick luxuriant growth of seeds from a dying civilization, dying even then with its youth stretching back into the inscrutable past of prehistoric times.

It must be borne in mind that Hippocrates lived in that glorious time of Greek civilization and culture, the golden age of Pericles, that his life overlapped that of Phidias and Praxiteles, of Anaxagoras, Socrates and Democritus, of Æschylus, Euripides, Sophocles and Aristophanes, of Herodotus, Thucydides and Xenophon, of Plato, Aristotle and Demosthenes. Never since, in the history of the world, have there existed in the span of one man's life so many men whose fame still shines in mortal records and whose words still influence the thoughts of men. Such a throng was not to be gathered from all the broad empire of Augustus, nor to be found in the brilliant court of the Grand Monarque, nor among those who flourished in the days of England's Virgin Queen. None can say that the great name of Hippocrates stands less illustrious on the role of medical science than does that of Socrates in philosophy, of Phidias in sculpture, of Demosthenes in oratory, of Thucydides in history, or of Aristotle in science. It is the evidence of the knowledge of the upper air passages and their diseases possessed by this great primeval figure in medicine with which we are now concerned. Among the large number of writings ascribed to Hippocrates, there are only a few which have been acknowledged by all authorities to have been really written by him. Some have been proven, many have been surmised, to have been written by his predecessors and successors. It seems probable that some were written by others during his life time who had the benefit of his guidance and of his instruction. However this may be it is not my aim to enter into a general discussion of such matters, but rather to bring into prominence those gleams of light thrown upon our subject which have come to us across twenty-five centuries. A reference to the editions of Adams and of Littré and to the works of Galen, will enlighten the reader as to the books which are accredited to Hippocrates himself and as to those which are supposed to have been written by others of his time or school. Some of the passages in the writings of these Æsclepiadæ seem ridiculous to us, but we should keep constantly in mind the charity which our successors in their histories will have to extend to the productions of our own times. Indeed, in looking over the various commentaries on Hippocrates from Galen's time to our own, it is curious and not a little amusing to observe how careful each critic is to point out the errors Hippocrates committed in not being in accord with the doc-

The Era of
Hippocrates

trines of the critic's own time, which are now as obsolete as those of Hippocrates. So little does Hippocrates have to say of the cure of diseases that Asclepiades, an early type of the genus charlatan, subsequently ridiculed his system by saying it was the contemplation of death. It is perfectly evident that he recognized the futility of drugs as curative agents, and all his works, especially those which are supposed to be genuine, testify to the persistence with which he studied the symptomatology rather than the pharmacology of disease.

Innumerable facts have been discovered since these early times, and the wonder chiefly is that they should have then been able to reason as acutely as they did from the little actual knowledge they had of normal anatomy or of pathological processes. We have seen from the few extracts I have been able to gather how primitive knowledge of the anatomy and physiology of the upper air passages was. In the Hippocratic treatises themselves we find it little more advanced.

In fact, until the writings of Galen, the knowledge of anatomy seems to have been almost nil from a modern standpoint.

"Drink through the pharynx and œsophagus. Larynx to the lungs and trachea. From these to the top of the bladder." This is the literal translation of the Greek text as given in Kühn's edition, but Kühn himself translates it "*Potus per fauces et gulam, arteriæ summum, quod larynx dicitur, in pulmonem et arteriam ex quibus in summan vesicam.*" This latter passage occurs in the book on the "Nature of the Bones (I) which is apparently a collection of notes. In the fragment of the book on "Anatomy" we find it stated that the bronchi terminate at the top of the lungs, being composed of curved rings. Then follows a description of the lungs and of other organs detailed in such a manner that no room is left for the supposition that the writer had any idea that fluids passed through the lungs to the bladder. Again, elsewhere,* we find, "If any one will give water tinctured with a blue color or with vermillion to a thirsty beast to drink, preferably to a swine, for this beast is not fastidious but dirty, and will then cut the beast's throat after the drinking, he will find it colored with the fluid." Nevertheless he says the greater part of it goes to the stomach. At the end of the Fourth Book on Diseases the author distinctly combats the idea that drink passes through the larynx. It is evident, therefore, from these quotations that no one man, but several, wrote the so-called Hippocratic

* *Liber de Corde.* Edit. Kühn I, p. 435.

treatises. History tells of the great rewards offered by the Ptolemies for manuscripts of well-known authors for their great library, and nothing seems more certain than that enterprising, and of course highly-respectable "rare-book" dealers, found it more convenient to write than to find hitherto unknown treatises of Hippocrates. The author of the Fourth Book on Diseases says, referring to the epiglottis, that the presence of a process in the form of an ivy leaf prevents liquid from entering the larynx and keeps it in the pharynx. He declared that the sounds emitted on expiration were multiplied by the resonance of the head. The tongue articulates as the air is driven out striking against the palate and the teeth. "All of which shows that it is the air which makes the noise." In the book on the "Flesh" (19) it is recognized that severance of the larynx stops the voice, which is regained when it is reunited.

On the subject of the destination of liquids when swallowed, there is a very curious chapter among Plutarch's "Symposiacs (Book VII). When a line from the poet Alcæus (611, 580 B.C.) was quoted, "Now drench thy lungs with wine, the dog appears"* (Dog Star), Nicias of Nicopolis, a physician, is made to say that Plato should be reproved for the passage in the *Timæus*† where he adopts the same error. He enters into an argument in refutation of the idea that the drink passes into the lungs, and he instances the epiglottis as an apparatus for preventing it. In the discussion which followed Protogenes, the grammarian, claimed that Homer first spoke of the stomach as the receptacle of the food, and of the breath and windpipe as the instruments of the voice, but the discussion on this passage in Homer hinged upon the meaning of the word *φάρυγξ* which we have seen had a very indefinite meaning. Florus quoted many poets, among them Euripides, who affirm with Plato that the drink passes into the lungs and the conclusion of Plutarch's Symposium seemed to be that Plato was right. Florus asserts that not only Hippocrates, but his pupil, Dioxippus, (390 B.C. ?) and Philis-tion, a very ancient physician of Locri, had no other thought. Dioxippus supposed that the epiglottis served to divide the food and drink into the coarser parts which passed into the stomach and the

* Vid. Gaisford: *Poet. Min. Graec.* Vol. III, p. 321, XVIII.

† The passage referred to reads "the lung is a soft and bloodless organ, and moreover is full of pores internally, like a sponge, in order that receiving air and drink it may refresh the heart, quiet it and cool the heat which burns it. This is the reason why the channels of the trachea are directed towards the lung, and the lung is placed near the heart." A few lines further on it is evident, however, that Plato recognized that some of the liquids at least go to the stomach, or rather "the region between the diaphragm and the navel."

finer parts which passed into the lungs. Aristotle* did not share this error at all, but distinctly states that the larynx is only for the passage of the air and the voice. From a passage in this symposium Sprengel seems to draw the conclusion that Erasistratus taught that the drink does not pass into the lungs. Now, Plutarch's writings are of a date in the first century of the Christian era, 500 years after the time of Hippocrates and 400 years after the time of Erasistratus. One hundred years after Plutarch we will find even Galen in a modified form entertaining this idea. He says, in reference to it: "If Plato supposed that we take all our drink into our lungs, it is proper to remark that he was ignorant of a very evident matter. If he supposed, however, some part of the drink passing through the trachea is carried to the lungs, he announces a thing possible and like other matters concerning which physicians and philosophers may disagree among themselves." He then proceeds to state that it is quite possible for a small amount of fluid to steal down the sides of the air tubes without producing irritation sufficient to cause a cough.

We may, since we have already digressed somewhat, add here another mention of Hippocrates by Plutarch. † He compliments him as a man of wonderful skill in physic and fit to be imitated by the greatest philosophers, especially as to his ingenuousness for "he confessed publicly that he had mistaken the nature of the sutures of the skull,‡ and has left an acknowledgement under his own hand; for he thought it very unworthy a man of his profession not to discover where he was in the wrong seeing that others might suffer and err by his authority." Plutarch's comment on this is quite as applicable to-day as in his own time. "And indeed it had been very unreasonable, if he whose business and concern it was to save others and set them right should not have had the courage to cure himself and to discover his own weakness and the imperfections in his own faculty." Quintilian echoes Plutarch's eulogium.§

When we realize that the ancients, Hippocrates, Galen and their followers, knew nothing of the muciparous glands, and of course nothing of the function of these microscopic structures, it is easy to understand the absolute mental necessity for them to find some explanation

* On the Parts and Gait of Animals. III, 111, 4.

† Man's Progress in Virtue.

‡ Vid. Hippocrates: Epid. V, § 27—cf. De Vuln. Cap. § 12.

§ Celsus, from whom probably Plutarch and Quintilian drew their information, remarks in regard to Hippocrates' superiority in this respect over lesser men. "Nam levia ingenia, quia nihil habent, nihil sibi detrahunt." Lib. VIII, Cap. IV.

of the origin of the secretions which bathe not only the respiratory tract, but the gastro-intestinal mucous membranes as well. As for the moisture of the lungs, it is natural that they should look for some explanation in the liquids swallowed. This lack of knowledge, as well as a mistaken anatomical observation, led them into another error which persisted still longer. The cribiform plate of the ethmoid bone (the sieve like bone) at the top of the respiratory tract, was usually seen only in the dried specimen by the ancients unfamiliar with dissection of the human body. The idea arose that the humors were distilled in the gland like contents of the cerebral cavities and sifted through the cullender plate of the ethmoid to parts below. If we can find no trace of this idea in Hindu or Egyptian medicine, Herodotus* supplies us with indubitable evidence that it existed among the Libyans. He says: "The Libyans, when their children come to the age of four years, burn the veins at the top of their heads. Others burn the veins about the temples. This they do to prevent them from being plagued in their after lives by a flow of rheum from the head and such they declare is the reason they are so much more healthy than other men. In all this I only repeat what is said by the Libyans themselves." This burning, as we shall have occasion hereafter to note, was the sovereign Arabian cure for all diseases.

This idea of the cerebral origin of catarrhs once fixed in the conception of medical men was not detected as an error even by Galen himself, whose anatomical knowledge was so extensive.† They supposed that the airs and vapors, as they called them, were inspired through the cribiform plate by the brain acting like a live sponge, drawing up into itself not only the moisture but the air of the nasal cavities and then redistilling them. Hippocrates says olfaction takes place through the cribiform plate. The latter he describes as being made of cartilage, soft like a sponge, and is neither flesh nor bone.‡ So entirely had this conception of the anatomy and physiology of the cribiform plate taken possession not only of the medical mind, but so completely had it passed into the popular mind, that it was supposed that the mental processes were sluggish in those in whom the faulty excretion led to a clogging of the brain with mucus. Hence, we find in Greek that not only Coryza stands for a cold in the head, but it was the name applied to a fool, a driveller. Still more was this evident in the

* Liber IV, Cap. 187.

† Vid. Galen: "De Instrumento Odoratus." Cap. iv.

‡ "The Flesh," No. 16.

Latin tongue. "Emunctæ naris" refers to the mental acuteness of the individual because he was supposed to keep his nostrils, the cloaca of the brain, well cleaned out. This is found chiefly in the satirists.

"Hinc omnis pendet Lucilius, hosce secutus
Mutatis tantum pedibus numerisque, facetus,
Emunctæ naris, durus componere versus."

Horatii Satira IV, 6.

"Obesæ Naris,"^v fatty or obstructed nose, in distinction to "emunctæ naris" referred to mental dullness. Many similar passages may be found in Martial. Hippocrates believed that in order to smell well the nose must be dry, and probably this arose from the observation of obtunded olfaction during a cold. He supposed that the vaporous parts of the inspired air escaped through the sutures of the skull.

Hence we may understand why Hippocrates looked upon the brain, which he described as a gland, as the origin of all catarrhal troubles, naming seven, of the eyes,* of the nose, of the ears, of the stomach, of the throat and lungs, of the spinal cord and of the hips. The acrid humors were distilled to these parts by various routes—to the respiratory and digestive tracts through the cribiform plate—but all starting from the brain.

Coryza.

In his book on "Ancient Medicine," where he protests against the entertainment of hypotheses as to etiology, Hippocrates describes the symptoms of a coryza. "This discharge is much more acrid than that which is usually found in and runs from the nostrils daily; and it occasions swellings of the nose and it inflames, being of a hot and extremely ardent nature, as you many know if you apply your hand to the place; and if the disease remains long, the part becomes ulcerated, although destitute of flesh, and hard, and the heat in the nose ceases, not when the defluxion takes place, and the inflammation is present, but when the running becomes thicker and less acrid and more mixed with the former secretion; then it is that the heat ceases." One of the Aphorisms (II. 40) reminds us that catarrhs and coryzas are not severe in old people. It is clear from a passage in the "Airs, Waters and Places" that Hippocrates believed that not only do stomach catarrhs have their origin in the head, but that nasal catarrh produces gastric symptoms. "Their bellies are subject to frequent disorders, owing to the phlegm

* The Glands 10.

running down from the head.” Another modern idea we are reminded of in the relation of a case* of habitual catarrh which was cured in three days by coitus.

Cynanche, which English translators usually render as quinzy, is a term Hippocrates applied to nearly all the acute inflammations of the throat. Littré (V. p. 579) discusses the question as to whether Hippocrates was familiar with diphtheria. Croup, Littré calls it. It is doubtful whether the cases are sufficiently differentiated in the Hippocratic writings to make them intelligible to modern readers. Even in the time of Littré's edition (1846) they would seem more intelligible than in these bacteriological days. They were of a very severe type, apparently, whatever the nature of them. We may conjecture that the peculiar and striking features of Ludwig's Angina or erysipelatous pharyngitis and laryngitis arrested Hippocrates' attention and caused him to record the case† of “the woman affected with quinzy who lodged in the house of Ariston.” Profound constitutional symptoms, severe external swellings, and evidently internal stenosis, causing dyspnea and the return of fluids by the nose, rapidly brought the case to a fatal termination. The etiology of cynanche was supposed by Hippocrates to be the coagulation of the blood in the vessels of the neck. One cannot imagine what sort of an angina could be the cause of opisthotonos‡ lasting forty days and getting well. One has only to refer to “Diseases II,” 26, 27, 28, 29, 30, 31, 32, to perceive how severe was the type of throat inflammation with which the Hippocratic writers were familiar and yet how impossible it is from the description to more than guess at the class we would now put them in; as, for instance, No. 26 seems to have been diphtheria, while accounts of the others indicate, some of them a milder type of disease, and some ending fatally, but apparently not diphtheria. In the “Coan Prognostics” is a paragraph (II 14) which deals entirely with the prognostics of acute throat inflammations, but it is of little modern interest. In the “Aphorisms” (IV 34, 35) Hippocrates declares that “if a person laboring under a fever, without any swelling of the fauces, be seized with a sense of suffocation suddenly, it is a mortal symptom.” Moreover, “if, in a person affected with a fever, the neck become suddenly distorted and he cannot swallow, except with great difficulty, although no

Acute Throat
Inflamma-
tions.

* Epidemics: V. 72, and VII. 69.

† Epidemics, III-VII.

‡ Internal Affections, 53.

swelling be present, it is a mortal symptom." Antitoxin, tracheotomy and intubation have of late years somewhat impaired the force of this prognosis, but we still recognize the gravity of the condition.

Intubation

Since the following passage contains an indication that the idea at least of intubation existed in Hippocratic times, and because also it is a striking bit of objective description, I will translate it as literally as possible from Kühn's text (Vol. II, p. 300):

"*Cynanche*.—From *cynanche*, so-called, a man chokes, and it seems to be especially in the pharynx, and he is unable to swallow his spittle or anything else, and his eyes are affected and start forth as in those strangling, and he stares with them straight ahead, and he is not able to turn them, and he hiccups and starts suddenly up, and the countenance and the pharynx are burning, and even the neck. To those looking on there seems nothing the matter. He sees and hears dully, and from the dyspnea he knows not what he says, nor hears, nor does, but lies there with open mouth drooling and acting thus. He dies on the fifth or the seventh or the ninth day.

"*Para-Cynanche*.—When some of these symptoms are absent, it appears the disease is not so severe and they call it *para-cynanche*. It is necessary to bleed, especially from the vein beneath the nipple of the breast, for this naturally follows from the hot breath, *pneuma*,* of the lung, and it is necessary to purge by drugs or move the bowels by enemata, and to *pass tubes into the pharynx* along the jaws, so that the breath may be drawn into the lungs, and to make them as quickly as possible to spit and thin the lungs (clear them out?) and to fumigate with Cicilian hyssop, and with sulphur, and with bitumen, and to breathe these in through the tubes and through the nostrils so that the phlegm may be cleared out, and the pharynx and the tongue may be cleaned in those having phlegm, and the veins under the tongue should be cut; and blood should be drawn from the elbows if the strength is sufficient. Abstention from wine should be enjoined and thin barley water should be taken. After the disease has subsided and the appetite returns, purging with fresh elaterium should be employed so that he may not fall into another illness." The appearance of an external rash in all these cases of severe, possibly scarlatinal and diphtheritic pharyngitis and laryngitis, was thought by Hippocrates and Galen, and reasserted by Avicenna, to be a good sign.

In "Diseases II," 30 and 31, he recommends hot fomentations for what is apparently peritonsillitis, and scarification of the tonsils, but

* For accounts of the pneumatic dogma and the pneumatists see any of the histories of ancient medicine.

this latter not with sufficient clearness to make us sure of the recommendation. He also speaks of treating external fistulæ, resulting from this affection, with the cautery. Evidently we have here a confusion of diseases according to modern classification.

The nature of the tonsils is explained (Glands 7) as round bodies placed on each side of the throat to absorb the secretions from the head and send them back there again, and to do likewise for the vapors. From acute and chronic inflammations they may become greatly swollen. For enlarged tonsils he advised evulsion with the fingers. Although we find in Hippocrates no mention of tonsillotomy, it is evident, from what is thought to be a genuine book of Hippocrates, viz: (The Prognostics, No. 23) that he was familiar with uvulotomy. In a book of less assured authenticity we read his description of the operation. "When the uvula alone is inflamed seize it with the finger and press it up against the palate and cut off the end."*

Uvulotomy
and Evulsion
of the Tonsils.

As has been intimated the Greek physician had every opportunity of familiarizing himself with fractures of the nose. The Hippocratic writers devote much attention to it. In "Mochlicus" 2, Articulations 35, 36, 37, 38, 39, we find minute and practical directions for its treatment. Indeed, comparatively little advance has ever been made over their methods. Great stress is laid upon the necessity of replacement within the first twenty-four or thirty-six hours after the injury. Satisfactory adaptation of the parts must be attained notwithstanding the patient's suffering, if a good result is to be reached. Hippocrates complains bitterly that the patient strongly desires the latter without being willing to submit to the former. For lifting the fragments of bone into place he preferred the fingers, making use of those of some boy or women assistant, if possible, because of their small size and their softness. Internal splints from "Carthaginian leather" or other suitable substances were used. He condemns the use of sponges for the purpose because they soon become foul with the discharges. He relates how in one case he made use of a piece of the lung of a sheep, probably as a temporary expedient. Sacrificial altars to the gods were always near the fields where the games were held in which many of these accidents occurred, and we may imagine the resourceful surgeon quickly cutting a piece of the soft elastic tissues from the open chest of the slaughtered victim and inserting it into the nostril of some vanquished athlete. While perhaps it is not so curious, a

Fractures of
the Nose.

"De Morbis" II, 29 and 49.

more valuable suggestion is contained in his description of the method of treating lateral displacements of the nose, of course when recent. An internal splint was inserted as usual and then a long leather thong was glued at one end to the point of the nose which was pulled beyond the median line to the opposite side, and the thong wound around the head and fastened by gluing to the temples or in some other convenient fashion. This could then be pulled more taut or loosened as occasion required.



From "*Galen Opera Omnia*," Basel, 1561, Vol. 6, P. 593.

Hippocrates* indulges in some satirical and still instructive remarks concerning bandages for a fractured nose.

"Those who put great store by a senseless dexterity rejoice to meet with a fracture of the nose in order to apply a bandage. For a day or two the physician takes great pride in himself, and the patient rejoices; but the latter soon tires of wearing the bandage, which is annoying; as for the doctor, it is enough for him to have shown that he understands how to put various bandages on the nose. Such a bandage does, however, quite the contrary to what is desired; on the one hand, in those in whom the nose had been sunken, it becomes markedly more sunken if pressure is exerted over it; on the other hand, in those in whom the nose has been dislocated to the right or to the left, either in the cartilaginous, or in the upper part, these, evidently, far from deriving any advantage from a bandage placed on it, suffer harm from it." We look in vain for any reference to operation for straightening a chronic deviation of the septum. It is a little surprising that with the experience derived from the treatment of recent fractures and dislocations of the nose, they should have failed to remedy the chronic lesion which must have been frequent enough. He insists that external wounds or comminution of the fracture are not contra-indications to his plan of treatment. He must have witnessed the results of tremendous blows, probably

* "*Articulations*," 35.

with the cruel cestus, the iron shod glove of the boxer, for he speaks of the sinking in of the bridge of the nose when there is also exfoliation of the bone of the hard palate. Evidently in these dangerous encounters fracture at the base of the skull was an occasional result. At least he was familiar with its characteristic symptom, for he says: "A contusion of the head without an external wound, either by fall, fracture or compression, produces in some cases the flow of acrid humors which run from the head into the throat." Possibly, however he may here refer to suppuration as a result of intranasal fracture.*

We have just seen that Hippocrates was familiar with depression of the nasal arch as the result of injury. That he was familiar with it as the result of disease would appear from† the relations of the cases of two‡ children who from ulceration lost their teeth and pieces of the bone of the palate. This caused a sinking of the nose. They also had a bloody muco-purulent discharge. This description sounds very much like that of syphilis, either congenital or tertiary. This is thought by the majority of writers to have appeared first in Europe two thousand years later, brought from America by Columbus' sailors. This sinking of the nose is again referred to in another place.§. It is to be gathered from Galen's commentary|| that he also was familiar with a sinking in of the bridge of the nose, due to a loss of substance in the structures beneath. Daremberg¶ has suggested that syphilis is the disease referred to by Hesiod (Fragm. 27, 28) who betrays a knowledge of some skin diseases in aphrodisiac women. After a perusal of the text alluded to, it seems to me very doubtful if this was the Corona Veneris as Daremberg surmises, though crusts and blotches were found in the scalps of these women. The passages here cited from the Hippocratic writings and from Galen seem much better evidence of it. We are unfamiliar to-day with any other disease of the palate and gums of a chronic nature which is accompanied by exfoliation of bone and the sinking in of the nasal arch. The nasal arch will not

* These excerpts from fractures of the nose I have taken from Adam's translation of the "Genuine Works of Hippocrates."

† Epidemics, IV, 19.

‡ This is the reading of Littré's translation, and to my mind that of Kühn's text, but the latter's translation refers to but one child.

§ Epidemics, VI, 3.

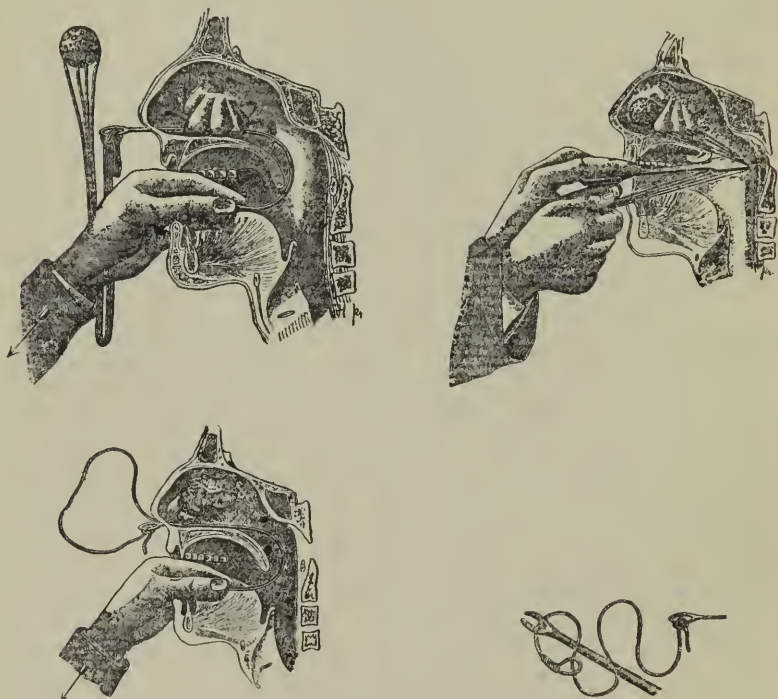
|| Edit. Kühn: Vol. XVII A, p. 823.

¶ Etat de la Médecine entre Homère et Hippocrate.

sink from the loss of the palate bone, except the nasal bones themselves are affected at their junction with the bony septum. Of course it may possibly have been some severe case of scurvy or phosphorous poisoning, but producing such results as these it seems very unlikely.

Nasal Polypi.

Probably there is nothing in the Hippocratic books so familiar to the modern rhinologist as Hippocrates' sponge method of removing



From Baldwin.

nasal polypi.* Indeed this was a method practiced by Voltolini and mentioned in his text book.† Until the comparatively recent invention of the steel wire snare, it compared favorably with other methods of ablation. An interesting paper on the "Rhinclogy of Hippocrates," by Baldwin,‡ is largely

* Diseases II: This book, from which I have quoted so freely, is said to have been written by Draco and Thessalus, sons of Hippocrates.

† "Die Krankheiten der Nase," 1890.

‡ "Zeitschrift für Ohrenheilkunde," Bd. XXVIII, Hft. 2.

taken up with a discussion of the various methods recommended by Hippocrates for the removal of nasal polypi, and the accompanying illustrations elucidate the procedures very much. There were several methods. The sponge method was used for those soft pendent polypi which move out and in the nostril on expiration and inspiration. It consisted of tying the ends of three or four strings to a sponge cut to the proper size and shape. The other ends knotted together were fastened to the eye of a soft slender tin or leaden probe which was pushed through the nose into the pharynx. The ends of the strings thus secured were passed over the end of a forked probe held in the pharynx. By traction across this, the sponge was dragged into the pharynx, if successful, bringing the polyp with it. In another method for harder growths, perhaps our fibrous hypertrophies, the principle of the snare was employed. The loop of a sinew was adjusted around the polyp, and the end having been carried to the pharynx and traction made as before, evulsion was attained. For still harder growths which Baldwin conjectured may have been bony cysts, he employed cauterization with a hot iron through a hollow tube used as a speculum. I do not see any reason for imagining this procedure was for this rare form of intranasal growth. It may easily have been many other pathological conditions, more likely to come frequently under the observation of the physician, such as cartilaginous spurs and hypertrophies. He speaks of a fleshy growth in the nostrils which he calls cancer, to be treated by the cautery, but as he says nothing about the strikingly fatal symptoms which ensue from any form of local treatment of malignant growth of the nose, it is doubtful if his term is equivalent to the present acceptation of it. He doubtless had encountered rhinoliths, for he speaks of something in the nose which, when you touch it with a probe, sounds like a stone. For this he recommended an external incision. After all these radical operations he advised the application of copperas powder and the insertion of tents in the nostrils, smeared with oil and honey, no doubt to prevent synechiæ and stenosis. I think that all rhinologists will agree that these procedures, for the time, were not bad intranasal surgery.

From the book on "Affections" we learn that all diseases come from the phlegm and the bile. The Hindu idea was that all bodily diseases come from Wind, Bile and Phlegm. Indeed, there are many resemblances in this book, as well as the one I have just quoted from, which remind us of the Susruta. Polypi were supposed to be caused by the phlegm. It was derangement of these

elements which produced diseases according to the Hippocratic authors. These books are not supposed to have been written by Hippocrates himself. Indeed, he explicitly discourages all theorizing as to etiology in his book on Ancient Medicine.

Epistaxis.

In various places Hippocrates has much to say of nasal hemorrhage as a symptom in many diseases, and in *Airs, Waters and Places* remarks that persons under thirty years of age are liable to severe bleeding at the nose in summer. In the *Affections* (No. 27) recommendations for stopping epistaxis include cold externally, a tent in the nostril, styptics and purging. One of the *Aphorisms* shows that he was familiar with vicarious menstruation as a cause of the nose bleed. "In a woman when there is a stoppage of the menses, a discharge of blood from the nose is good." (V. 33).

Sinusitis (?)

Various other references to diseases of the upper air passages may be found in the *Aphorisms*, and among them one (VI. 10) referring evidently to the symptoms of aural or nasal sinus disease:

"In a person having a painful spot in the head, with intense cephalalgia, pus or water, running from the nose or by the mouth or at the ears, removes the disease." It was supposed, as we have seen, that the origin of this discharge was the brain.*

The last of the *Aphorisms* applies with especial force to the nose and throat, though it is meant of course to be of general application. (VII, 87). "Those diseases which medicines do not cure, the knife cures; those which the knife cannot cure, fire cures; those which fire cannot cure are to be reckoned wholly incurable." A similar apothegm is found in the Hindu *Susruta*.

In the clinical notes which go under the title of *Coan Prognostics* we find an intimation that phthisis pulmonalis is a result at times of nasal catarrh, cases thus arising being considered most dangerous of all. (II, xxi, 430). This is a superstition which still lingers in medicine and is continually reappearing in some form or other.

There is a passage in this book which is of considerable value in the differential diagnosis of hemoptysis, especially among a people who drink directly from brooks and springs and pools in the primitive fashion. (II, 17). "In those in whom the throat becomes filled with blood several times, day and night, without

* Vid: Galen's Commentary. Edit. Kühn: XVIII. A. 20.]

preceding pains in the head or cough or vomiting or fever or pain in the chest and back, look in the nose and throat. You will find there either a wound or a leech."

It must be borne in mind that there are many other passages in the Hippocratic books of great interest to the laryngologist, but I have already cited enough to convince the reader that a compilation of them all would make a brochure, on the diseases of the nose and throat, which no modern student of laryngology could afford to despise.

FROM HIPPOCRATES TO CELSUS.

There now followed a period of more than four hundred years before a medical work was given to the world which was destined to survive the ravages of time, the vicissitudes of empire and the vandalism of man, and to transmit to us at first hand the state of medical knowledge in the Roman world at the zenith of its power and vigor. From Hippocrates to Celsus is a long stretch in the history of the world. It is crowded full of events of absorbing interest and importance to our present civilization. It witnessed the rise and glory of Grecian civilization and its absorption into the world-wide domain of imperial Rome. In the Hippocratic era tiny Greece was battling with that huge menacing bulk of Oriental despotism, the enervating and soul-enslaving empire of the Persian kings. In that death struggle for our civilization she rolled back from Marathon (490 B. C.) Platea (479 B. C.) and Salamis (480 B. C.) that tide of stifling slavery and voluptuous sensuality, which was threatening to engulf the garden she had planted and to extinguish the torch she had lighted at fires long since quenched by this very Orientalism. From the rugged mountains and wind-swept isles of Greece this eastern terror recoiled to the plains of Asia. Ninety years later, ten thousand Greeks, a mere handful among millions, marched fifteen hundred miles into the heart of the Persian empire and after putting to flight an army of a million men turned around and cut their way out again. When next they plunged into Asia, seventy years later, it was with the youthful Alexander at their head. They dismembered the lifeless body of Orientalism which had been so long a menace to them, and for a thousand years it lay prostrate before it again threatened the civilization of Europe. When it was again about to inundate the budding civilization of the west, Don John, of Austria, at Lepanto (1571), and John Sobieski, with his Poles, at Vienna (1583), again stemmed the rising tide and forced it back. In the century which now opens before us, the

drama of two civilizations played on the stage of the world for twenty-five hundred years by the immortal gods is, let us hope, drawing to a close. Although the ancient Greeks shattered the cohesiveness of the mighty Persian empire they could not graft on the barren limbs of Orientalism the buds of their own fructifying activity. In vain did the generals of Alexander and their successors call around them the most brilliant minds of the age. The libraries of Pergamos and Alexandria, with their hundreds of thousands of volumes, and the great schools which were founded with lavish expenditure of Oriental treasure wrung from slavish races by their Grecian rulers, advanced enormously the state of medical knowledge, but these institutions with the records of their own and of past scientific labor, planted in a land powerless to defend them, perished utterly at the hands of a succession of ruthless Roman and Saracen conquerors. The universal prevalence of the spirit which creates such monuments is the only bulwark which can defend them.* As Gibbon suggests† the loss to literature pure and simple was probably not great, but to medicine and science it was irreparable, for only in such a collection of books can we hope to find those of ancient date which appeal to the understanding of man rather than to his emotions. It is the historian of science alone who fully realizes that the destruction of the great libraries accomplished greater wrong to humanity a thousand times over than any event history records. The great poets, historians, dramatists have many of them been preserved to us, but not so the records of those parts of civilization which administer directly to man's material comfort and health, and thus indirectly to his happiness.‡

We are reduced, therefore, again to the necessity of scanning secular literature and of extracting second hand from the later works of Galen, Pliny, Oribasius, Rufus, Aetius the scanty records of the labors of more original workers than they. We have every reason to believe that enormous strides were made in anatomy by the schools of Alexandria where dissection of the human body was first certainly regularly pursued. It is even said that the school of Alexandria indulged in the practice of human vivisection.§ This is related with a shudder by the historians who delight to report the innumerable tortures inflicted upon innocent men by their fellow-men from

* "Il n'y a pas de système qui puisse durer autrement que par des institutions." (Guizot.)

† "The History of the Decline and Fall of the Roman Empire," Vol. V, P. 228.

‡ The School and the Library of Alexandria was founded 320 B. C. by the Ptolemies and was finally destroyed 640 A. D.

§ Celsus: "Lib. I., Proenmium."

motives of ambition, pride, lust and revenge. The statement is received with horror by a cultured and refined public, who peruse with pleasure and avidity the other pages of history reeking with gore and replete with accounts of human misery. Erasistratus, Herophilus and their confrères, if they did it at all, seemed to have pursued their investigations on gentle murderers and other virtuous criminals, out of the reprehensible motives of enlarging the boundaries of human knowledge and increasing the powers of man's benevolence and humanity. This practice attributed to the Alexandrian school has been denied and certainly not satisfactorily proven. Dissection of the dead human body as well as of animals, however, did at this period, create the science of anatomy. The records of this fruitful activity have, as has been said, utterly perished, but we may see from the works of Hippocrates and of Aristotle how deficient was the knowledge of human anatomy before, and from the works of Galen how enormously increased it was after the foundation of the libraries and schools of Pergamos and Alexandria.

Singular to say, Aristotle (384-322 B. C.), who dominated the medicine and the philosophy of the dark ages, and who was said to have long practiced physic before he devoted himself to pure science, has left behind him very little pertaining directly to medicine, notwithstanding his profuse contributions to nearly all other branches of knowledge. Nevertheless we may find in his works a few indications of his conception of the anatomy of the upper air passages. He placed at the top of the nostrils a kind of a lid which rises at the time of inspiration to let in the odors. "There is no passage from the ear to the brain, but there is to the roof of the mouth." He described the larynx as the organ through which the voice and the breath pass, and as situated in the front part of the neck. He says the trachea is cartilaginous and surrounded by smooth rings and contains but little blood. "It lies at the upper part toward the mouth opposite the passage from the nostril to the mouth, wherefore if any liquid is drawn into it in drinking it passes out of the mouth through the nostrils." "Between the passages is the epiglottis, which can be folded over the passage which extends from the trachea to the mouth; by the epiglottis the passage of the tongue is closed; at the other extremity the trachea reaches to the middle of the lungs." "The heart is connected with the trachea by fatty cartilaginous muscular bands." The uvula is described as a very vascular organ. He speaks of the epiglottis as part of the tongue. He

recognized* that the voice was produced within the trachea by the impact of the air, inspired by the soul which he thought resided in the heart and lungs, against it. "It is the voice and the larynx which emits vowels; it is the tongue and the lips which form the consonants, or the aphonic letters."† As we have seen (l. c.), Aristotle was free from the error of supposing that drink passes into the lungs.

Praxagoras was the last of the *Æsclepiadæ* of whom we have record. We read in "Cœlius Aurelianus‡ that he recommended cutting off the end of the uvula or scarifying it deeply when it was greatly inflamed. He transmitted the medicine of Hippocrates to his pupil Herophilus (300 B. C.), the great anatomist of the Alexandrian school. He is said to have instructed the latter in the knowledge of the pulse, which he afterwards so greatly developed. Pliny refers to Herophilus as the "vatis medicinæ,"§ the oracle of medicine. He, in all probability, contributed greatly to the anatomical knowledge of the upper air passages, but only the merest hints of it remain to us. Thus we learn from Rufus Ephesius|| that he called the hyoid bone the parastate because it was situated near the tonsils. According to Soranus, quoted by Oribasius (XXIV, C 31), Herophilus likened the cervix uteri gravidi to the larynx. Plutarch, from whom we have so often to quote, after mentioning¶ some incomprehensible theories of Empedocles and of Asclepiades, says that Herophilus attributes a moving faculty to the nerves, arteries and muscles, but believes that the lungs are affected only with a natural desire of enlarging and contracting themselves. From the citation made by Marx in his brochure on Herophilus (P. 34), I would infer that the latter thought that the lung drove the air into the pleural cavity, and then, receiving it back again, expelled it externally. Erasistratus and Herophilus both knew that the arteries contained blood and that the pulse was connected with the heart, and yet apparently the circulation of the blood remained unknown for eighteen centuries. We learn from Celsus (Lib. IV, Cap. 12) that the former used ligation of the extremities as a remedy for hemoptysis.

* De Anima: II, VIII *vid.* Translation by St. Hilaire "Traité de l'Ame," p. 225.

† "Hist. of Animals," IV, Chap. IX.

‡ "De Morb. Acut.," III, C. IV.

§ "Hist. Nat.," II 37, 88 Sec. 219.

|| "Du Nom des Parties du Corps" (Edit. Daremberg), p. 155.

¶ "De Placit. Philosoph.," XXII.

Eudemis (279 B. C.), we learn from Rufus (l. c.), compared the styloid process to the spur of a cock, but gave it no name. This is a small gleaming from a period of several hundred years which marked the beginnings of the study of anatomy, but as to the upper air passages we look in vain for more, at least until the time of Asclepiades.

ROMAN MEDICINE.

Pliny is often quoted as saying that Rome for 600 years was without physicians but not without physic. Cato, the Censor, (b. 232 B. C.) we know had a very poor opinion of the doctors and in fact of learning in general. He was instrumental in driving Carneades and the other Greek savants from Rome in his day, but it cannot be conjectured that this arose from any skeptical turn of mind on his part, for in his book on Agriculture, amidst many receipts, amulets, charms and invocations we find him prescribing his favorite, almost his sole, drug for nasal polypus: "If there is a polypus in the nose rub together some dry wild cabbage leaves in the hand and place it at the nose and draw up the breath as much as you can. In three days the polypus will fall away. Nevertheless, for some days do the same; so that you may render the roots of the polypi entirely healthy."

It was not until the year 219 B. C. that Greek medicine found its way to Rome. Arcagathus was the first Greek physician, who, about that time, came to Rome.* He was very unsuccessful. We may read in Plutarch's Life of Cato, the Censor, how the Romans treated Carneades, the Athenian philosopher and Ambassador, in order to appreciate the prejudice with which the sturdy but rude old patricians of ancient Rome viewed the introduction of Greek civilization. It has always been noted in the history of the world that the first advances which have tended to ameliorate the asperities, to increase the amenities, and to introduce a wider knowledge among a rude and vigorous people have met with the suspicion and contempt of the conservative majority, who look upon the innovations as the first steps towards effeminacy and degeneration. It was not until the time of Asclepiades (100 B. C.) the friend of Cicero (106-43 B. C.) "is quo nos medico amicoque usi sumus, tum eloquentia vincebat ceteros medicos"†

* "Cassius Hemina, among the most ancient authors, is authority for the report that the first of physicians to come to Rome from the Peloponessus was Archagathus, the son of Lysania, in the year of the City, 535."—(Plinii Naturalis Hist. Lib. XXIX Cap. 1-6.)

† "De Oratore," I Cap. 14.

that the art of medicine really began to flourish in Rome, and we soon find Cicero describing the wonders wrought by the immortal gods,* not the least of which are the marvels of the human anatomy. "It will be more easily appreciated what has been done for man by the immortal gods, if the whole fabric of man is examined, and the perfection and method of human structure is brought to our comprehension. The life of living creatures is maintained by three things, by food, by drink and by the breath (*spiritus*) and for making use of these the mouth is especially adapted because it is reinforced by the air from the adjoined nostrils. The food is masticated by the teeth arranged in the mouth, and by them divided and softened. The sharp front teeth divide the food when bitten, and the back ones, which are called the true teeth, prepare it and this preparation seems to be aided even by the tongue. The esophagus, adherent to the tongue at its root, receives from it that which has been received by the mouth. This, touching the tonsils on each side, is continuous with the end of the palate and this it is which receives the food after it has been pushed along by the movements of the tongue, and passes it downwards. Those parts which are lower down than that which swallows (the food) are dilated, while those parts above are contracted. But since the "*Aspera Arteria*," for thus it is called by physicians, has an opening joined to the roots of the tongue, a little above where the esophagus is joined to the tongue, and since this reaches to the lungs and receives the air (or soul-*anima*) that being received from the breath (*spiritus*) and this being inspired and again returned, it is protected, as it were, by something like a lid, which is provided for the reason that if by any chance food should fall in it, the breath would be stopped. Since by its nature the belly, attached below to the esophagus, is a receptacle for food and drink, and the lungs and heart form an exit for the breath, in the belly many things are admirably arranged, which it is about agreed, are (controlled) from the nerves (*nervis*). It (*i. e.*, the gastro-intestinal tract) is, however, multiple and tortuous, and it encloses and holds that which it receives whether it is dry or wet, so that it may be altered and digested; it is by turns contracted and relaxed, and everything which it receives it compresses and mixes, so that all things, prepared and digested by the heat, of which it has much, and by the attrition of the food and especially by the breath (*spiritus*), are distributed to the rest of the body. In the

* "*De Natura Deorum*," II, 54.

lungs, however, there is a certain looseness of texture and a softness, similar to the sponges, most carefully adapted for drawing in the breath. They in turn contract on expiration and dilate on inspiration, so that the nourishment by which breathing creatures are principally supported may be frequently taken in."

In another passage (*Ibid*, Lib. II, Cap. 57) Cicero intimates the existence of further knowledge of nasal physiology in his remark: "Likewise the nares, which are always open on account of necessary functions have narrower entrances lest anything which might be injurious should enter them, and they always are supplied with a moisture not useless for arresting dust and many other things." Of course we can not suppose that Cicero included bacteria in his "multaque alia depellenda."

After all, these passages from one of the greatest masters of human speech who has ever lived, and a man profoundly imbued with all the knowledge of his day, are perhaps not a bad index of the state of knowledge of the anatomy and physiology of the air and food tracts. It is a great advance over anything we can find in Hippocrates and Aristotle.

As to Asclepiades, that eloquent rhetorician of Bithynia, the friend of Cicero and Crassus, the great advocate of diet, exercise and massage, and enemy of bitter doses and radical treatment generally, we have only a few fragments, collected by Gumpert. He made a great stir in his day; he declared that so perfect was his regimen, disease had no terrors for him; he was never sick and only died because he fell from a ladder and broke his neck in extreme old age.* Synanche† he said was "a flow of the humours or a wetness of the fauces, or rather of the very top of them, coming down from the head." Besides the purging and bleeding he scarified the tonsils and the fauces around them. Moreover he approved of the practice of incision of the trachea as recommended by the ancients, which they called laryngotomy,‡ to relieve the respiration. Themison, the founder of the school of Methodists and a follower and disciple of Asclepiades also approved of this surgical

* Pliny: *Hist. Natur.*, VII, 37.

† Cælius Aurel. *de Morb. Acut.* III, c. 1.

‡ Cælius Aurelianus (*de Acut. Morb.*) Lib. III, Cap. IV, Edit. Amman P, 193—Asclepiades—"At si major (inquit) passio fuerit, dividendæ sunt fauces, hoc est tonsillæ et partes supra uvam constitutæ; etenim summa est in his æqualis sive par incisura, quam appellavit *homatomia*. Dehinc a veteribus probatum approbat arteriæ divisuram, ob respirationem faciendam, quam laryngotomiam vocant, varie ac multipliciter peccans."

This is the first mention we find of this operation unless it is referred to in the Talmud. It is a good illustration of how much must have been lost from the old records. Cælius expresses the belief that the account of the ancients doing it was not true but an invention of Asclepiades.

operation. Celsus (Lib. IV, Cap. IX), quotes him approvingly and recommends his prescription of swallowing strong vinegar in ulceration of the fauces, and says that he condemned the practice of Erasistratus ligating the extremities for hemoptysis. With this condemnation Celsus does not agree. So far as the throat is concerned, therefore his practice to-day would not be called very mild or conservative.

CELSUS AND THE PRÆ-GALENIC WRITERS.

In the eight books of the "De Medicina," which remain to us from the writings of Aulus Cornelius Celsus, who was probably born in the last days of the reign of Cæsar Augustus, about the beginning of the Christian era, are found several chapters which deal with the diseases of the upper air passages. Written by a Roman patrician, it is the first and almost the only work of medicine which has come down to us written in the Latin tongue as used by Virgil and Horace,* and all that brilliant coterie of men who adorned the imperial courts of Augustus and Tiberius, and sauntered through the gardens of Mæcenas. As an interpreter of Hippocrates he was profoundly influenced by the precepts of Asclepiades, but he evidently was a man of virile understanding and original powers, whose works still contain much of value to the surgeon.

Coryza.

In his chapter on coryza (Lib. IV, Cap. V), he repeats the conviction of Hippocrates that some cases of phthisis owe their origin to catarrh of the upper air passages. "*Destillat autem humor de capite interdum in nares, quod leve est; interdum in fauces, quod pejus est; interdum etiam in pulmonem quod pessimum est.*" For him, as for Hippocrates before him and Galen after him, the humor dripped through the cribiform plate. So far as the coryza is concerned, indeed, he says, there is nothing pestiferous about it unless it ulcerates the lungs. He recommended as treatment

* The following lines have been held by some medical historians to refer to the physician Celsus, but there seems every reason to believe it was the somewhat earlier poet Celsus to whom Horace here, as several times elsewhere, alludes:

"*Quid mihi Celsus agit? monitus multumque monendus
Privatus ut quærat opes, et tangere vitet
Scripta Palatinus quæcumque recepit Apollo,
Ne si forte suas repetitum venerit olim
Grex avium plumas moveat cornicula risum
Furtivis nudata coloribus.*"—(Horat. Epist. I, 3, 15).

We see by this extract that the library on the Palatine Hill, founded by Augustus was already in requisition by writers, and already the charge of plagiarism was much indulged in by the literati.

abstention from daily routine, and protection from the weather, as well as abstention from the bath, wine and venery. He approved of active exercise in the house and laid great stress upon massage. He advised against overeating and recommended that only a half pint of water a day be taken as drink. Warm vapors, the head and neck wrapped in flannel, and especial care to be given to the diet, were also urged. These prescriptions were varied somewhat as the discharges became thicker, but at all stages massage and exercise were to be employed.

In regard to throat inflammations (Liber IV, Cap. VII), those which are confined to the fauces, he said, the Romans called angina, while the Greeks gave the name synanche to that form in which there was dyspnea without any appearance of inflammation in the fauces, and cynanche to that form where the obstruction could be made out in the fauces. The Greeks supposed the former condition (i. e. the synanche) to be due to the disease of the "pneuma" itself, and that this it was which caused a collapse of all the parts of the chest and neck.*

Angina,
Kynanche,
Synanche.

With Celsus cupping, bleeding, purging were the remedies employed, the cups to be applied around the fauces. Hyssop, thyme, absinthe, bran or dried figs steeped in water were the highly agreeable gargles he used, though all his prescriptions were not so mild. Vinegar, powdered pepper and oxgall also formed part of his pharmacopeia. In certain cases he made deep incisions externally beneath the jaws and bled from the lingual veins. His incision into the palate above the uvula (VI-X) was more in accord with modern practice in quinzey. Without the necessary differentiation of diphtheria from quinzey or other inflammatory processes, we can readily understand his remark that "if the patient is not aided by these things, then we may know he is a victim to this disease." He apologizes for mentioning a remedy, which seems later to have been very popular in Rome for centuries, saying that it was somewhat out of place in a scientific work. Pliny and Galen mention the same and speak highly of its efficiency. A swallow either fresh or salted, having been kept thus in the house for the purpose, is to be burned to a cinder and the ashes, moistened in water, are to be applied to the throat in a

* There seems to have been great confusion among the Greek medical writers at this date in the use of the two terms. Galen in his "Commentaries on the Prognostics of Hippocrates" (Edit. Kühn XVIII, B. 267), intimates that the two terms arose out of a different reading of the initial letter in the word, as used by Hippocrates, by different writers, and that Hippocrates made no distinction. This is probably the correct explanation. We will find Aretæus making elaborate distinctions in the use of the terms.

threatened attack of angina. Pliny* dwells on the same remedy at considerable length, and dilates on the difference in the efficacy of the different kinds of swallows. On a reference to the Hindu Susruta (Vol. II, Cap. XXII) will be found the prototype of this prescription. "In affections (of the throat) arising from the blood and bile, cure is obtained by the use of swallows." This is one of the many instances of the Oriental origin of this sort of therapy. Celsus thinks no apology necessary when in the next chapter on dyspnea he recommends a paste made of dried fox liver powdered. He also advises it should be roasted and eaten. Even for dyspnea he recommends moderate exercise and does not forget massage.

Diphtheria.

"By far the most perilous of all ulcers (of the mouth) are those which the Greeks call *Ἀφθᾶς*, chiefly in children, for in men and women there is not the same peril." (VI-XI). Evidently this is diphtheria. He remarks that ulceration of the fauces is frequently followed by a cough, for which, of every description, he recommended long sea voyages, sea-side resorts and sea bathing. (IV-X). He devotes a chapter (IV-XI) to the spitting of blood and recognizes vicarious menstruation among other more frequent causes.

Ozena.

For ulcerated nares he recommended (VI-VIII) vapor of hot water from a narrow-necked vessel, and mineral astringents were applied to the ulcer. "But if these ulcers are around the openings and they have many crusts and a foul odor, which variety the Greeks call *Ὠζᾶνα*, it should be recognized that it is hardly possible to cure this disease. Nevertheless these things may be tried; let the head be shaved to the skin, and persistently and vigorously rubbed; let it be bathed with plenty of hot water; let there be much walking; moderate food, nothing very sharp or very strong; then in the nostrils let honey be applied with a small amount of the resin of turpentine, which may be used on a probe wrapped with wool; let this liquid be drawn in with the breath until the taste of it is perceived in the mouth; by the use of this the crusts are loosened, which may then be removed by the use of sternutatories." How accurate this prognosis was we still have reason to know; how excellent the local treatment was we still bear testimony to in our present therapy of irritating applications to the nostrils. We recognize here another method of treatment which has been thought to be entirely modern. He advises

* Hist. Animal. XXX, 4, 12.

leaving pledgets of lint saturated with some medication in the nostrils, this to be done twice a day in winter and spring and thrice a day in summer and autumn.*

In another place (VII-XI) he describes a very radical surgical operation for the cure of ozena, which has also been urged by at least one modern author.† Celsus does not, however, himself indorse the operation, which consisted in the use of the actual cautery through an earthenware tube or the quill of a writer's pen, and the affected parts thoroughly seared, and the wound dressed with astringent and soothing applications. Nasal polypi, which he likened in appearance to the nipples of a female breast (VI-VIII), he treated by caustics. He described them as showing in front on the lip and sometimes behind, "by that foramen through which the breath descends to the fauces," hanging down so that it may be seen behind the uvula, and in cold, damp days it strangles a man. Some he calls *καρκινώδης*, and these should not be touched. Elsewhere he shows how the other kind may be cured by operation (VII-X). He used a sharp instrument like a spatula to separate it from the bone, and then by means of a hook it was to be removed. His surgical treatment for large and hard tonsils was to separate them from the sides of the throat with the finger (VII-XII) and tear them out, or drawing them inwards with a hook to cut them off. His operation for uvulotomy has not been improved upon. He cut the frenum linguæ for trouble in speaking, and this relieved many, but he had seen it fail once. He also was familiar with ranula. He mentions hare-lip, and elsewhere (VII-IX) describes operations for the cure of that and other deformities about the face by plastic methods. He operated on bronchocele by making an incision through the skin and shelling the tumor out with the finger (VII-XIII). It may be easily seen from these few extracts that Celsus was well entitled to the name which has been given him—the Roman Hippocrates.

We have already had occasion to quote from Pliny knowledge which he said he had derived from the Magi. He died at the foot of Mount Vesuvius on that dreadful day (August 25, 72 A. D.)

* " * * linimentum involutum et oblongum eodem medicamento illinendum, de mittendumque in narem, et ab inferiore parte leniter deligandum. Idque per hiemem et ver bis die; per æstatem et autumnum ter die fieri debet." Bertherand, *Médecine et Hygiène des Arabes*, 1855; p. 502, notes the treatment of ozena among Arabs, of Algeria, by means of insertion in the nostrils of a seton of wool or a tuft of hair soaked in honey and some irritating substance. These, of course, are what we know as Gottstein's tampons.

† Rethi: *Arch. fur Laryngol. und Rhinol.*, Band ii, Heft 2.

after a cloud shaped like a pine tree had the day before shot up in the air above the smoking mountain. It was seen by Pliny from his villa on the shore of the beautiful Bay of Naples at Misenum, and summoning the Roman galleys he commanded, he sailed into the mephitic vapors to rescue his terror-stricken friends, and perished in the attempt. Pompeii and Herculaneum lay buried beneath the hot ashes and cinders, and thus kept treasured up for eighteen hundred years the relics of the power and pride of Rome, who thought herself mistress of the world, to excite the wonder and curiosity of travelers from lands she had never dreamed of. He lay dead upon the shore, a brave man and a philosopher, and the work which he left behind him, the *Historia Naturalis*, became all through the Middle Ages the source from which credulous humanity derived its pharmacopia.

The Therapy
of Pliny.

In the Dark Ages, among the half-civilized barbarians who flooded the Roman Empire and nearly extinguished the torch of civilization, the necromancy and the filthy drugs of Egypt and Chaldea found the ready market which Grecian culture and Roman civilization in the better ages never offered. The entrails and excreta of birds and reptiles and shell fish, all manner of fish, bird and beast, besides innumerable plants and minerals fill page after page of Pliny's treatise. Large numbers are recommended for nose and throat diseases, with very little discrimination as to the affections for which they were prescribed. In fact, one pursues the record of drug therapy through the history of medicine with very little profit. One may sum it all up by saying that human ingenuity has applied all medicaments to every disease.

Perhaps, after all, the best definition of a drug is that incidentally given by Montaigne in boasting of the health of his progenitors: "For them everything which was not in ordinary use took the place of drug." For an illustration of these remarks one may turn to Dioscorides, whose botanical and pharmacological work dates from about this time. Here we may find the swallow prescription in many forms, not only for anginas, but for many other affections.

Aretæus.

The Roman Empire, by the victories of Cæsar and Pompey, had undergone an immense expansion. All roads soon led to Rome. Asclepiades we have seen as the friend of Crassus and Cicero, but he came to Rome for fame and practice from his native Bithynia. It is not certain that Aretæus lived in Rome, though it is probable he was acquainted with the practice of Italy. He was a native of Cappadocia. Even the exact date of the medical activities of

Aretæus seems very uncertain, but it is supposed that he lived shortly before the birth of Galen (131 A.D.), in an era extending perhaps from the reign of Titus (79 A.D.) to that of the great Marcus Aurelius (161 A.D.). It is singular that so few contemporary and subsequent medical authors mention Aretæus, whose writings in perspicuity of observation and brilliancy of execution are surpassed by none in the history of medicine. His chapter on diseases of the uvula is an interesting exposé of the different appearances presented by that organ in disease. The inflamed, reddened œdematous uvula; the elongated uvula, sometimes with what was apparently a papilloma at the end of it; the broad uvula, with bat-like wings at the side—for all these he had separate names—besides the bifid uvula, for which he had no name (“but which was recognizable by all”), while that is especially the form to which we moderns have given a name. He also described a condition left behind after an oblique amputation by the physician, a piece of membrane hanging down at the side. As to the symptoms we may use the translation of Adams:* “A sense of suffocation accompanies all these affections, and they can by no means swallow with freedom. There is cough in all the varieties, but especially in those named *lorum* (a broad, flat strap), and *fimbria* (the border or edge; this is the variety having a club-shaped end to it). For a titillation of the trachea is produced by the membrane, and in some cases it secretly instils some liquid into the windpipe, when they cough. It is safe to apply the knife in all these varieties; but in the *uva*, while still red, hemorrhage, pains and increase of inflammation supervene.” In the chapter on the treatment of disease around the uvula, he states that many of them require surgical treatment, but these he does not discuss, his work on surgery having been lost. In this chapter it is evident that some severe faucial inflammation, accompanied by œdema of the uvula and by symptoms of dyspnea, many of the cases ending fatally, were familiar to Aretæus. We can only conjecture that some of these were diphtheria. His therapy was not especially different from that of Celsus in such cases, but at the end of this chapter on the therapy of the diseases of the uvula, occurs a sentence which to me is inexplicable on any other ground than that of the existence of syphilis, or again of some disease with which we are now not familiar, as I remarked in citing a similar passage from the Epidemics of Hippocrates. In this sentence of Aretæus the

The Uvula.

Syphilis.

* Sydenham Edit. 1856. Of the Affections about the Uvula; Therapy of Acute Diseases. Book I, Chap. VIII.

suggestiveness, to my mind, is still more striking. We may translate it thus: "But should the part become purulent, in some, the bones of the palate are destroyed, and having lingered a long time wasting away, they die." Now "consumption," as Adams translates it, does not produce necrosis of the palate except in very rare cases, and in these almost never beginning as a primary disease, but rather as a rare incident in the progress of general tuberculosis. Personally I have never seen a case of necrosis of the hard palate caused by anything but syphilis, though, of course, as before remarked, we must keep in mind the rare cases of scurvy and phosphorus poisoning.

Kynanche and
Synanche.

I have already had occasion to refer to the use of the two words kynanche and synanche, and have quoted Galen's remark that the difference apparently arose from the different readings of the initial letter of the word by the transcribers of the Hippocratic treatises. Cynanche (κυνάγχη) is a word applied to the choking of a dog, and Aretæus makes a part of his clinical picture of throat inflammation to consist of the tongue sticking out as a dog does, even in health. It must be borne in mind that Aretæus was supposed to be a disciple of the chief exponent of the Pneumatists, Archigenes, and hence we find him saying that he believed synanche to be a disease of the "pneuma" pure and simple, and he applies the term to those cases in which no obstruction is visible, or to those in which the inflammation has also descended to the thorax, but whether to one or to the other, they all have the common symptom of dyspnea, and he adduces the significance of the word, not as Galen suggests, but from the collapse of the parts about the neck and chest. Of course, it is evident here again that there is a misleading classification of throat inflammation, if we take into account our present system, and we perceive the classification of Aretæus is really founded upon the situation of the lesion rather than its nature. That some of these cases were also diphtheria admits of no doubt, but in the category he also included peritonsillitis and the graver forms of phlegmonous inflammation. As in Celsus, we find mention made of abscesses in these cases opening here and there around the ears externally, and it again becomes evident that they were familiar with more cases of severe and deep inflammation around the fauces than are we.

After admiring the many agreeable prescriptions recommended by Aretæus, we are shocked in the description of an elegant poultice scented with bay leaves, to find him gravely advising, as very efficacious in promoting suppuration, that the surface shall

be sprinkled with the finely sifted dung of pigeons and dogs; but, on the whole, the treatment of the simple inflammatory conditions by local applications we recognize as most judicious. When it is apparently diphtheria, or other obstructive disease of the larynx, Aretæus and his confreres were helpless, and recognized the malady as deadly. He tried to bring the disease outward by sweats and counter irritation. In this place, the chapter on the Therapeutics of Synanche, occurs the much quoted passage in regard to laryngotomy, which I would translate thus: "But those who, as a precaution against suffocation arising from synanche, cut the trachea for the dyspnea, do not seem to me to have shown by the attempt that the operation is warranted, for the heat of the inflammation becomes greater from the wound, and besides increases the dyspnea and the cough; but if they escape from this danger, the lips of the wound do not heal, for they are both cartilaginous and unsuitable." [Here the fragment of this chapter abruptly ends.] Now, if we remember that Aretæus supposed that the dyspnea arose, not from obstructive causes as we understand them, but from a disease of the "pneuma" or breath itself,* we may understand how irrational a procedure the opening of the air tube seemed, and we well know that in the worst cases which were the ones usually reserved for tracheotomy, even up to the time of the advent of intubation in our own day, the results, on account of the extension of the trouble below the trachea, fully justified Aretæus' skepticism. We have seen that Asclepiades approved of the operation, and we shall find Paulus Aegineta, several centuries later, describing the operation and attributing it to Antyllus. While, as we have seen, there is abundant evidence that the other chapters on diseases of the throat include reference to cases which were diphtheria, there is a special chapter devoted to a description "Of the Ulcers about the Tonsils," in which the disease is unmistakable. His description is very vivid, but as to the etiology he gropes in the dark, very much as men have done in all ages when seeking after the causes of phenomena. He says it occurs more frequently in children because they especially draw in deep and cold breaths; and there is more heat in them. They are greedy and hungry and their desires are capricious. They are petulant and do a great deal of bawling. It is common in

Laryngotomy.

Diphtheria.

* We may briefly define the pneuma as conceived by the ancients to be that part of the breath which contained the vital energy, but it would lead us too far astray to discuss all the various ramifications and forms and consequences of this idea, so necessary in some shape to any conception of the mystery we call life.

girls until the beginning of the menses. It is especially common in Egypt and Syria on account of their diet and the dryness of the air. Hence they are called Egyptian or Syriac ulcers. We smile, but probably no more contemptuously than future historians will at our own ideas of etiology. They die he says from the foulness of the odors—from the ptomaines say we. In his symptomatology we miss only one characteristic, and that is the coughing up and the expectoration of the membrane, but this we find mentioned by Galen. His treatment included the use of escharotics and the cautery for the so-called ulcers. Various powders of an astringent nature were to be blown on them through a quill or a tube.* We hear little of massage and exercise from Aretæus; this therapeutical fad, like all fads, had had its day since the time of Asclepiades and of Celsus. We cannot part from Aretæus without quoting his description of the fatal termination of cases of these pestilential Syriac ulcers:

“The manner of death is most piteous; pain sharp and hot as from carbuncle; respiration bad, for their breath smells strongly of putrefaction, as they constantly inhale the same again into their chest; they are in so loathsome a state that they cannot endure the smell of themselves; countenance pale or livid; fever acute; thirst as if from fire, and yet they do not desire drink for fear of the pains it would occasion; for they become sick if it compress the tonsils, or if it return by the nostrils; and if they lie down they rise up again as not being able to endure the recumbent position; and, if they rise up, they are forced in their distress to lie down again; they mostly walk about erect, for in their inability to obtain relief they flee from rest, as if wishing to dispel one pain by another. Inspiration large, as desiring cold air for the purpose of refrigeration, but expiration small, for the ulceration, as if produced by burning, is inflamed by the heat of the respiration. Hoarseness, loss of speech supervene; and these symptoms hurry on from bad to worse, until suddenly falling to the ground they expire.”†

As in the case of Aretæus, a similar uncertainty as to the time and locality in which Rufus Ephesius lived, is to be noted in history. He evidently was anterior to Galen, who speaks of him as

* Heymann credits Aretæus with being the first to make local applications to the larynx in this way, but it is found frequently mentioned in the Hindu writings. It is doubtful, however, if the powder ever got as far as the larynx. Without modern appliances and the laryngoscope, this is a difficult matter.

† I have here used the excellent translation of Adams.

one of the recent writers, while he does not refer to Aretæus at all, who must have flourished about the same time. It is said that Rufus Ephesius lived during the reign of Trajan, which began in 98 A. D. He wrote much on anatomical subjects and quoted extensively from the works of others. His own work, or rather such of it as has remained to us, is of little value. I have extracted from it the following notices which pertain to our subject. He speaks of the tonsils* as four in number, two on each side of the pharynx (σαρκώδη καὶ ἀδενοειδή) fleshy and gland like. We note thus early the occurrence of the word "adenoid" applied to the structure of this tissue. Again, in the "Anatomy of the Parts of the Body," ascribed to the same author, occurs the following: "At the deepest portion of the tongue and at each side of this organ are arranged at its base excrescences called lateral glands of the isthmus to the number of six; they have a gland like structure. The form is rounded. They are moveable and easy to excise; they are attached by means of small membranes which hold them at the base. Four are to be seen at each side of the bottom of the mouth—two are less visible." We may conjecture there has here been some mutilation of the text. He noted they are more prominent when inflamed. He recognizes that the uvula is of little use and its amputation produces no alteration of function. As we shall see, in the description of the tonsils he is less accurate than Galen, but more in accord with modern teaching as to the uvula. Rhazes, an Arabian writer, quotes Rufus as saying: "In fracture of the nose it is well to fill the nostril completely with cotton (or silk) stuff, and not extract it until the nose has taken its shape."†

Adenoids

Here is, perhaps, the place to introduce a quotation by Paulus Aegineta from the lost works of Antyllus, a surgeon of much note, who is said to have lived during the reign of Hadrian (117-138 A. D.). It is the first specific description of the technique of the operation of tracheotomy. I avail myself of the Sydenham translation of Adams (Vol. II, P. 301). "The most famous surgeons have also described this operation (laryngotomy). Antyllus, therefore, says, 'In cases of cynanche (as we will explain under the head of Dietetics) we entirely disapprove of this operation, because the incision is wholly unavailing when all the arteries (the whole of the trachea and bronchi) and the lungs are affected; but in inflammations about the mouth and palate and in cases of indurated tonsils, which obstruct the mouth of the windpipe, and

Tracheotomy
of Antyllus.

* "Concerning the Names of the Parts of the Body;" Edit.: Daremberg, P. 64-65.

† Edit.: Daremberg, P. 471.

the trachea is unaffected, it will be proper to have recourse to pharyngotomy in order to avoid the risk of suffocation. When, therefore, we engage in the operation we slit open a part of the *arteria aspera* (for it is dangerous to divide the whole) below the top of the windpipe, about the third or fourth ring. For this is a convenient situation, as being free of flesh, and because the vessels are placed at a distance from the part which is divided. Wherefore bending the patient's head backwards, so as to bring the windpipe better into view, we are to make a transverse incision between two of the rings, so that it may not be the cartilage which is divided, but the membrane connecting the cartilages. If one be more timid in operating, one may first stretch the skin with a hook and divide it, and then removing the vessels aside, if they come in the way, make the incision.' These are the words of Antyllus." Now, by the phrase in parenthesis, "for it is dangerous to divide the whole," we are reminded of the passage I have cited from the Talmud. We may, therefore, entertain some conception of the antiquity of the operation of tracheotomy, though it is not mentioned in Pliny.

Cælius Aurelianus is another of the many medical writers whose epoch we can not definitely ascertain, though it is supposed he was a contemporary of Aretæus and of Galen. His barbarous Latin and his ignorance of Greek show that his knowledge of polite literature was limited, but his accurate description of disease, and especially his copious citations of earlier writers whose books have perished, make his works important in the history of medicine. He describes very vividly the symptoms of acute throat inflammation*, which he calls *synanche*, and he includes under this head everything of the kind. His treatment does not differ materially from that of Aretæus. He was very fond of the use of oil both as a *menstruum* for gargles and for the inunction of the whole body, when he used it warm in severe cases. He disapproved of the practice recommended by Hippocrates and his followers, of bleeding from the veins beneath the tongue in *synanche*, saying it did harm rather than good. He notes Hippocrates suggestion of passing a tube along the tongue into the pharynx (or larynx?) for the relief of dyspnea. He strongly condemned the practice which he says Asclepiades falsely ascribed to the older writers of opening the trachea. He says the report is an invention of Asclepiades, that it is rash and dangerous, and it

* "De Acutis Morbis," Lib. III, Cap. I, II, III, IV.

would be a crime to perform it.* Nevertheless, we have seen that Antyllus, who must have lived about the same time, carefully describing it, according to Paulus Aegineta. Aurelianus has a chapter on hoarseness† arising from colds and shouting, and notices the diseased uvula as the cause of chronic coughs; he has also a chapter on coryza.‡

GALEN.

Gibbon begins his immortal work, "The Decline and Fall of the Roman Empire," with the sentence: "In the second century of the Christian era the Empire of Rome comprehended the fairest part of the earth and the most civilized portion of mankind. * * * If a man were called to fix the period in the history of the world during which the condition of the human race was most happy and prosperous, he would, without hesitation, name that which elapsed from the death of Domitian (96 A.D.) to the accession of Commodus" (180 A.D.). It was in this epoch, at the culmination of the mightiest empire that the world has ever seen, that Claudius Galen lived. It was under Trajan (98-117 A.D.) the [empire reached its greatest territorial extent§, and in the following reign of Hadrian (131 A.D.) Galen was born. With many vicissitudes of favor and exile he practiced at Rome and elsewhere. His early life was passed under the beneficent reign of Antoninus Pius, and that of the great Marcus Aurelius, whose friendship he is said to have enjoyed, but in his last days he must have witnessed the disgraceful scenes which marked the reign of the brutal and licentious gladiator Commodus, to whom he was physician in ordinary, and those of his impotent and infamous successors, when mighty Rome had already begun to totter towards the long delayed collapse of its wide spread power. Hence it is that after Galen we are to meet no great work in medicine, which marks its material progress, for more than a thousand years. So intimately are all the forces of civilization interrelated and interdependent that the history of no one division can be intelligently followed without the sidelight which other parts throw upon it.

We see in Galen the culmination of the medical progress of the ancient world, and in the light he transmitted the new world, when

* "De Morbis Acutis," III, iv.

† "De Morbis Chronicis," II, vi.

‡ "De Morbis Chronicis," II, vii, viii. For a more complete review of the work of Cælius Aurelianus, especially in regard to diphtheria and angina, *vid. Munch. Med. Woch.*, October 17. 1899, No. 42.

§ Freeman: "Chief Periods of European History."

it first began to emerge from the chaos of Rome's destruction, made its first feeble move towards a renewed growth in the development of medical knowledge.* I have several times had occasion to anticipate in this history the account of some of Galen's views, and it is not necessary here to review these. I have also had occasion to animadvert upon the great advance of the anatomical knowledge of the upper air passages displayed in the works of Galen, beyond that to be found in the works of his predecessors. It needs very little perusal of them to convince one of the enormous strides made in the anatomy of the human body since the days of Hippocrates, five or six hundred years earlier. From Celsus, one hundred years his senior, and from Aretæus, perhaps his contemporary, we can derive only slight information as to the anatomical and physiological knowledge they possessed. They were evidently men of commanding talent, but their works which have been preserved are too meagre for us to form much of an idea of their fundamental knowledge of the human body and its functions. It is in Galen's writings, therefore, that we first gain an idea of the advance made in those departments of medicine by the Alexandrian School of Anatomists. It is significant of the influence exerted by the great libraries of Pergamos and Alexandria that the birth and early education of Galen is accredited to the former city, and that he acquired at least some of his knowledge in the latter.† It would have been manifestly impossible for any one man to have himself originated the discovery of one-tenth part of the new anatomical facts we meet with in Galen for the first time, although he doubtless is the real author of some of them, especially of those in regard to the larynx. Far inferior to the author of the best of the Hippocratic treatises in talent and in genius, but greatly surpassing him in accurate knowledge, Galen is contentious, prosaic and tiresome to the last degree. I would recommend that those who love to indulge in medical polemics should, as a punishment to fit the crime, be compelled to read *seriatim* the extant works of Claudius Galen.

* It is true that for seven hundred years his works were not read in Europe, but after Gregory destroyed the library on the Capitoline, that might be said of every other medical writer of merit. Under the Eastern Empire, during this time he was confessedly or secretly, with Pliny, the origin of all medical knowledge, but the first translations of Galen from Greek into Arabic, and hence into Latin, are in the eleventh and twelfth centuries, while direct translations from Greek to Latin did not take place until the fourteenth century.

† If, as it appears probable, Galen was not acquainted with the dissection of the human body, it would seem to follow that the practice of the Alexandrian School in the time of Erasistratus and Herophilus had not persisted to the time of Galen. This cessation, if it really took place, we may conjecture to have been due to the prevalence of indigenous Egyptian prejudice over the tendencies of Greek science.

It is, however, to these very personal qualities we are indebted apparently, not only for all the medical learning of his own times, but for very much which we possess of that which existed before his birth in the works of earlier writers. This it is which has raised the medical works of Galen above all others in importance to medical science, greater even than those of the school of Cos. Had the latter not come down to us in their own form, we would still have most of them reproduced either literally or in substance by Galen.

Galen described an intermaxillary bone* in man. This apparent mistake was probably due to his observations on the skeletons of animals which he seems to have dissected much more frequently than man. It led many hundreds of years afterwards to a warm discussion between anatomists. Finally, in the last century, Vicq D'Azir and Goethe definitely settled the matter by showing that traces of this intermaxillary bone are found in the skulls of children and in the fetus. This was one of the forerunners of Darwinism, a discovery of one of the suggestive facts which, with Goethe's Metamorphosis of Plants, formed the germ of the doctrine of Evolution in the animal and vegetable world, and of the Spencerian philosophy. It is a striking instance of the necessity of a proper soil for the germination of any observation of nature. Had the old Greek and Roman civilization persisted a few centuries more, who can doubt but that the circulation of the blood† would have been known a thousand years earlier, or that the enlightenment which has followed the promulgation of the doctrine of Evolution would have been similarly antedated. Galen fully recognizes the nose as the beginning of the respiratory tract.‡ He describes the muscles§ of the external nose as two in number, one on each side, for the dilation of the nostrils, and he understood the distribution of the facial or hard part of the seventh pair of nerves to them. ||

The Inter-
maxillary

Galen's description of the internal nose in the "Instrumentum Odoratus," reads as follows: "The nose having a median dividing wall has two conspicuous openings, one for each nostril, and each one of them is divided in the upper part into two portions. One of these divisions leads to the mouth and the other one upwards

Nasal
Anatomy.

* "De Usu Partium," XI, Cap. XX.

† After a careful perusal of much of the writings of Galen I am unable to grasp thoroughly the idea he had of the circulation.

‡ "De Usu Partium," XI-II. I make use chiefly of Kühn's Edition.

§ "De Dissectione Musculorum."

|| "De Usu Partium," Lib. XVI, 3.

so that it starts from the entrance and ascends to the brain itself. There are two hollow oblong off-shoots of these (it?) towards it (these?)* having their beginning from the anterior cavities, reaching to that part of the skull where the nose has its origin. At this point is the situation of the sieve-like bones (ethmoid), the function of which the name indicates, and the thick membrane (the dura mater) with which that of the bones is continuous, is pierced by fine openings. Through these first the thicker parts of the excretions from the brain are transmitted (the custom was started by Aristotle of calling such things excretions), for things more vaporous mount to the sutures and escape from it. The thick part of these, such as phlegm in coryza, is carried downward, having first passed through the dura mater. After having been strained through the sieve-like bones, it thus passes into the channels of the nose. There is a part runs into the openings of those channels heretofore mentioned which lead into the mouth itself; and the mucus, especially such as is viscid, part of it falling at one end into the channels leading into the mouth, the other part into the passages on both sides which lead outwardly, is blown forcibly from the nostrils and is hawked out through the mouth. A bloodless (sic) membrane, thicker than the skin, lines those straight passages of the nose leading up to the sieve-like bones, and likewise those other oblique channels which I have said end in the mouth. This membrane is continuous with that lining the circumference of the whole mouth, and covering the tongue, and in addition to these the pharynx, the larynx, the trachea and the esophagus. To this membrane, which is one from the beginning and continuous, and in all the parts mentioned has the appearance of the same substance, but has not the same thickness in all parts, certain small nerves are distributed, springing from the brain, except those to the tongue." This idea of the brain as the origin of the secretions of the mucous membranes of the respiratory and digestive tracts, as has been said, was due to the ignorance of the existence of the muciparous glands and to the absolute mental necessity of finding some explanation for the presence of the mucus. As we have seen, the idea is found in the Hippocratic writings and it persisted for two thousand years in medical belief. The eyes and ears were also supposed to void their secretions

* Kühn's Greek text, from which I translate, does not seem to me to warrant the Latin construction which accompanies it. Neither the text nor the translation of Kühn are here felicitous. We must imagine that the text itself has been mutilated by ignorant and careless copyists, but Kuhn's translation in making use of an unwarranted construction does not thereby elucidate the anatomical description.

through the lachrymal sac and the Eustachian tubes into the nose. He describes the trigeminus nerve* as sending filaments to the mucous membrane of the nose and palate. In order to show how closely, in spite of the gross errors as to the internal anatomy of the nose, Galen's physiology corresponded with what is orthodox doctrine in laryngology to-day, I quote from another work of Galen.† Although the first sentence or two has now become obsolete, the rest seems as though it might have been taken from a modern text-book of the nose and throat: "It has been said concerning the uvula, in the commentary concerning the voice, that it contributes to the strength and beauty of the latter, and both in an admirable manner, since the entering air first is divided by it and the force of its current is broken, and thereby that of its frigidity, so that some of those who amputate it at its base not only clearly injure the voice, but the increased coldness of the inspiration is felt, and many breathing this into the lungs and the thorax are thereby killed, so that it is not right to cut it off rashly, nor as chance would have it, but to leave some part of it at the base." "It has been stated before in regard to the perforations within the nostrils, how wonderfully the bone situated in front of the ventricles of the brain receives them, being similar to a sponge, and in regard to the passage of these into the mouth which is in the palate, how it is arranged that the beginning of the inspiration is not directly into the trachea, but there is a certain deflection of it, as a curve, before the breath arrives in the trachea, which arrangement it seems to me has a two-fold advantage; first, because the air surrounding us is at times quite cold and the lungs then would be chilled; and, secondly, because small particles of dust or of ashes or anything of this kind may not fall into the trachea. In this bend, indeed, the breath may be carried further, but small particles of this kind are arrested so that they first, at this turn, fall upon soft and wet surfaces which are somewhat mucilaginous and are thus able to retain those which fall. If any get as far as the mouth, they stick to the palate and uvula. An exemplification of this is what daily happens to those who wrestle in much dust, as well as to those who are on a dusty journey. In a little while they blow dust from their nostrils or spit it out; but unless the channels of the nostrils were first directed straight up in the head, and thence obliquely backward to the palate, and unless the uvula were there, it is evident that nothing would prevent every-

The
Functions
of the Nose.

* "De Usu Partium," IX, 15.

† "De Usu Partium," XI, 11.

thing falling into the trachea, for this sometimes happens when one breathes by the mouth. I have even seen many athletes beaten in this very way, because the dust being breathed in by the mouth, they are nearly suffocated. When, indeed, any inflammation or tumor is present or any other affection obstructing the nose, then they are compelled to breathe through the mouth; from which thing it is possible to know that the nose is first in order as an organ of respiration, while the mouth, if nothing affects the animal, is in no way the organ of respiration, but in certain cases mentioned is an aid to respiration, which all directly points to the fact, which I have urged at the beginning of every disquisition, that our Maker formed all these things with one end of His work in view."

The Voice.

Galen's book upon "The Formation of the Voice" has been lost. Doubtless, had this been preserved, we would have been able to find much of interest in it. As it is, we read much concerning the external muscles of the neck,* and we learn that he distinguished twelve intralaryngeal muscles, *i. e.*, six pairs.† He described the cartilages of the larynx as three in number, the thyroid, the cricoid and the arytenoid. He supposed the latter was a single cartilage. We have seen how Aristotle described the anatomy of the trachea. For him it was made up of entire cartilaginous rings superimposed one on the other; but Galen knew better, describing the membranous portion behind and recognizing its function‡ of facilitating deglutition.§

He is somewhat confused in his description of the production of the voice, at least in the books which have remained to us; but it seems as near as possible to the proper explanation in an age when the vibratory movements of the air as well as its other physical properties were so imperfectly understood. He claims to have been the first to discover and describe the ventricles of the larynx, and he well understood that the glottis was the point at which the voice was produced, likening it to an ancient flute. He describes the vocal cords as a membranous substance so constituted to resist the impact of the air and lubricated by mucus to prevent injury from the vibrations of a dry surface.¶ "For it is pointed out there ("The Formation of the Voice") both that the trachea prepares and prearranges the voice for the larynx, and it being arrived there, they

* "De Usu Partium," VII, Cap. 17, et seq.

† "De Dissectione Musculorum."

‡ "De Usu Partium," XII, 3.

§ "De Dissectione Musc."

¶ "De Usu Partium," VII, 13.

(the cartilages) increase it, and it is still further augmented by the vault of the throat which acts like a sounding board, the palate like a plectrum." (l. c. VII, 5).

He reproves those who think the voice is sent forth by the heart, but declares that the larynx is the instrument of the voice.* He corrects Erasistratus† for saying that the pulmonary vein, like the bronchi, is free of blood; the latter, he says, contains blood only when there is a tear, or an anastomosis with a blood vessel, when it mounts to the pharynx and is voided.

We have seen that Galen, in a very qualified manner, was inclined to share the belief of his predecessors that fluids when swallowed passed at least to some extent into the lungs, and he seems to have believed that it is possible, by allowing medicaments to slowly melt in the mouth and by restraining the inclination to cough, for some of the material to find its way into the larynx and thus benefit those suffering from affections of that organ, which he often noted in actors, singers, etc.‡ The drugs he commended for these troches are much the same as we use to-day. This was a favorite method of medication with Asclepiades. Perhaps it was for this reason that Galen declared that ulcers of the windpipe are easily cured. His explanation of speech was couched in almost the same words as that of Aristotle, saying that the voice produces vowels and the tongue, nares, lips and teeth form the consonants.§

He seems to have appreciated the identity of the lymph glands The Glands. in the neck with those of other localities, for he says: "There are around the pharynx and larynx certain glands similar to those in the mesentery, but these latter are small, and on this account are not commonly recognized, but those around the fauces and larynx are large and prominent."|| This, of course, could only have been learned by careful dissection, and from the context we may imagine that he confused pathological with physiological conditions.

Galen¶ quotes Marinus as saying: "The use of all the glands is two-fold; (1) for they either support the deep vessels which are accustomed to be suddenly swelled (?) and undergo the dangers of divulsion on account of more rapid movements; (2) or they are able to moisten by the generation of humors the parts which are

* "Placitis Platon. et Hippocratis," II, 5.

† "Usu Partium," VII, 3.

‡ "De Compositione Medicament."

§ "De Locis Affectis," IV, 9.

|| "De Aliment Facultat," III, 6.

¶ "De Semine," Lib. II.

in need of viscid and wide-spread lubrication, lest easily becoming dry they may be unfit for motion. (And as for the other kind of glands which reinforce the vessels whose function it is to open (?) we will leave that for the time, as we have no use for it in this place.)”

Elsewhere Galen* explains “that since the glands, which fill what space there is in the midst of vessels distributed to various parts, act as a foundation or support for this distribution, they are of no very great use to living beings, but nature out of its abounding provision has formed these glands as it has many other things.”

Galen’s† reference to glands around the larynx and pharynx similar to those of the mesentery, may mean the thyroid and the tonsils. He refers in the same manner here to glands as elsewhere. This, quoted by Morgagni‡, I am unable to find in Kühn’s Galen. Galen, or whoever is the author of the book, “De Voce et Anhelitu,” says: “The neck, however, has two glands in which humidity is generated. But from these two glands which are in the neck veins are not given off in which the humor runs as in those which come from the glands of the tongue.” Evidently the thyroid gland.

He vaunts his discoveries in the larynx thus: “Attend, therefore, especially to this exposition which I have in hand, because I was the first to discover it. None of the anatomists have hitherto known anything of these nerves (the recurrences), nor of those things hitherto mentioned concerning the structure of the larynx. Therefore, having turned your attention to that which is most to be respected, and having become a pupil worthy of the instruction about to be imparted, listen to the exposition setting forth a most wonderful phenomenon of nature.”§ This wonderful arrangement was the reflection of the recurrent laryngeal nerves around the vessels of the thorax; but when he proceeds to explain it on the principle of the pulley, so that they may approach the laryngeal muscles from below, his solemnity and impressiveness in preparing the wondering pupils for the great secret seems a trifle ludicrous to modern readers. However, no one has really ever succeeded any better in attempting to explain this anatomical phenomenon, though there have been many theories advanced since the days of Galen.

* “De Methodo Medendi,” XIV, Cap. XI.

† “De Alimentorum Facultatibus,” Lib. III, Cap. VI.

‡ Morgagni: “Adversaria Anatom,” I, 26.

§ “De Usu Partium,” VII, 14. For a discussion of this subject, with an interesting account of a modern theory, see *The Lancet*, January 21, 1893.

Elsewhere* he again claims that he was the first to discover and give a name to the recurrent nerves, those only being known to his preceptors which were near the arteries (pneumogastrics). In several places he makes the statement that chilling of the recurrent nerves during operations damages the voice, and he, therefore, advised against operations in this region during cold weather. He relates the case of a boy who was operated on for a struma, which was removed by evulsion, causing aphonia, due to injury of the recurrent nerves. In this connection it may be well to mention a belief of the old Greek philosophers, the origin of which Galen, in confuting with much prolixity, ascribes to Zeno, the Stoic, it having been transmitted by Diogenes Babylonius and subsequently taught by Chrysippus.† Cicero‡ expresses it thus: "The trachea reaches from the lungs to the back part of the mouth through which the voice, taking its beginning from the mind, is perceived and has its origin." Galen says the Stoics reasoned thus: "It is evident the voice cometh from the mind. It is also evident it cometh from the larynx. Hence the mind is not in the brain." Galen demolishes this sophism thus: "They will wonder when they hear the voice is produced from the brain, and much more after having heard that all voluntary motion is performed by the muscles. * * * For the muscles move certain parts upon which the breathing and the voice depend, and they themselves in their turn are dependent on the nerves from the brain. If you surround any one of these with a ligature, or if you cut it, you will render the muscle to which it is distributed motionless, as well as the limb of the animal which has moved before the nerve was cut." Another evidence of Galen's familiarity with experimentation on animals in elucidating the function of the laryngeal nerves is to be found further on in the same chapter: "The bones being removed from the brain, or its ventricles in some manner compressed, immediately there is not only no voice or breathing, but the animal is at once deprived of all sensation and of all motion during the compression."

Galen adopted Hippocrates' idea, and thought health resulted from the proper equilibrium of the four humors, the tempera-

Humoral
Pathology.

* "De Locis Affect," I, 6. According to Baas, Marinus (100 A. D.) discovered the inferior laryngeal nerves. He gives no reference.

† *Vid.* Galen: "De Placitis Platon. et Hippocrat.," Lib. II.

‡ "De Natura Deorum," II, 59: *Primum enim a pulmonibus arteria usque ad os intimum pertinet, per quam vox principium a mente ducens percipitur et funditur.*

ments so called, resulting from the preponderance of one or more humors. He applied the four qualities to the four elements thus:

Water	Cold and wet.
Earth	Cold and dry.
Air	Warm and wet.
Fire	Warm and dry.

He applied to the humors the theory of the elements. Every disease is engendered by one of the humors or several combined. "The phlegm is an imperfect blood which may become true blood by the action of the natural heat of the body. In the phlegm water is abundant. It is cold and wet like water. It nourishes the brain and all cold and wet parts. It tempers the blood and aids the movements of the articulations." We thus see it has directly to do with the mucous and serous membranes. In its other ramifications the description of the applications of this doctrine is prolix and fatiguing. Its adoption tended to suppress originality of thought, just as any system always does.

I have detailed at considerable length the indications of the anatomical and physiological knowledge which Galen possessed of the upper air passages, not only because in his work we first meet with any considerable notice of such knowledge, but because this knowledge formed the basis upon which rested for more than a thousand years the superstructure of theory and practice, until, indeed, it received from Vesalius and his followers a rational criticism, and eventually a refutation of his doctrines of pathology. The abolition of the latter by the physicians of the Renaissance and later, was a boon to suffering humanity. It was one of the many fetters which bound the human intellect—may we never see its like.

As to other passages of interest concerning the nose and throat in the works of Galen, those treating of their diseases need not detain us long.

Anosmia.

We have seen the defects in Galen's knowledge of the anatomy and physiology of the nose, and hence we need not be surprised that he instances obstructive anosmia as a condition in which the air may pass through the cribiform plate to the brain without the odor—the particles of the latter being too large to pass through the perforations in the membrane lining the cribiform plate.*

As a further illustration of the supposed entrance of the air or rather of the "pneuma" into the brain, he instances the case of a

* "De Usu Partium," VIII, 6.

man who after forcible inhalation of an irritating substance into the nose, suffered acutely with headache referred to the frontal region.*

Galen seems to have divided diseases of the nose into two classes, polypi and ozena—corresponding, perhaps, to the modern classification of hypertrophic rhinitis, including edematous hypertrophy and polypi, and atrophic rhinitis including possibly syphilis, if it then existed. Elsewhere, however, among the Definitions (No. 371), he states that ozena is a deep ulceration in the nostrils, emitting a breath of a bad odor, and says: "Sarcoma is the unnatural growth of flesh within the nostrils. Indeed, a polyp is a kind of sarcoma. * * A sarcoma differs from a polyp in size and structure." His differentiation of nasal disease was, of course, very faulty. He gives a very large number of prescriptions, both of his own and others, for the so-called ozena and polypi, but his therapy for these affections is decidedly inferior to that of Celsus. There is no reference made to Hippocrates' method of removing nasal polypi. Considerable attention is given to epistaxis as a symptom of various general diseases, but not as much stress is laid upon this point as in the Hippocratic treatises. He, as did his predecessors, recognized the dependence of diseases of the larynx upon affections of the parts above, but they explained this by the assumption that the brain was the common origin of all catarrhs. We find in Galen abundant evidence of the influence of what I have called Chaldean medicine, the excrement of men and animals being freely used in throat inflammations. Bleeding from beneath the tongue was also a favorite remedy in all affections of the pharynx and larynx.

Polypi and
Ozena.

We have seen how Celsus and Aretæus subdivided inflammations of the throat into Kynanche and Synanche. Galen refers† to the book of Prognostics of Hippocrates to prove that all these inflammations were at first called Kynanche. Galen himself, while not disposed to increase the number of names, divides throat inflammations into five varieties. First, inflammation of the fauces. Second, difficulty of breathing with no inflammation of the fauces or swelling of the external parts. Third, when the region of the fauces externally is inflamed. Fourth, when the fauces internally and externally are inflamed. This all seems very nonsensical, but we must remember the influence of the school of Pneumatists. Although Galen supplanted all schools, he was by no means himself free from the influence of many of their theories. Fifth, in

Varieties of
Kynanche.

* "Instrumentum Odoratus."

† "De Locis Affect.," IV, 6.

both Galen and Hippocrates there is a description of a throat affection which Galen explained as a dislocation of the odontoid process of the axis vertebra. I am entirely at a loss to identify this affection, unless it was a post pharyngeal abscess. They both speak of it as an affection more or less commonly met with, and Galen created a fifth class for it.

Diphtheria.

If any doubts have arisen as to the correctness of the assumption that diphtheria was known to earlier writers, the following passage from Galen should set the matter at rest. It occurs incidentally in Galen's treatise on therapeutics.* "For thus the youth having an ulcer of the pestilential disease in the trachea regained his health, and others in the same manner after him. In another youth, about eighteen years old, a cold having gone on for many days, a little fluid blood came up after a cough—not much—but after this he coughed up some part of the membrane itself, which, having remained behind in the trachea, came up through the larynx into the pharynx and mouth. It seemed to me from the apparent thickness of it and from the patient's sensations, it came from the body of the larynx. Thenceforth the man's voice was injured, and this for some time, but he eventually recovered."

Iatros.

Thus far in making citations from the works of Galen I have refrained from quoting from "Iatros, or The Surgeon," a book usually included in the more authentic works of Galen. While the latter may have written the introductory parts, nothing can be more certain than that he is not responsible for the body of the work. Evidently it is the work of another and a much inferior hand. It is full of anatomical and physiological errors which Galen himself in his other works has refuted or shown that he did not share. Galen's great familiarity with Hippocrates would have prevented him from making the statement we find in the "Iatros" that if the nasal bones are broken they cannot be straightened. Galen in his "Commentaries on the Hippocratic Treatises," dealing with this subject, shows his perfect familiarity with the treatment of such cases.† We find also that the author, whoever he was, made the same distinction between kynanche and synanche as did Celsus and Aretæus, a distinction which Galen, as we have seen, distinctly repudiates. He agrees with Galen in attributing great importance to the epiglottis as a protection to the larynx, but he

* "De Methodo Medendi," Lib. V, Cap. 12.

† Also in the "De Fascibus:" In the Basel Edition of Galen, 1561, Vol. VI, p. 591, et seq., may be found a number of woodcuts illustrating in the most graphic manner the methods Galen describes for nasal bandaging, including those suggested by Hippocrates Phalera and Amyntas.

fails to add any precept of caution to his mention of the operation of amputation of the uvula to which Galen attached such necessary physiological functions. He speaks of the tonsils as four in number, one at each side of the fauces, and one at each side of the base of the tongue, this being the first mention of the lingual tonsil. He used a sharp, narrow spatula to separate nasal polypi from the bone, and afterwards shaved off the roots with a sharp knife. It is in this book that the assertion is positively made that Asclepiades actually performed laryngotomy in extreme cases of dyspnea, but there is no comment with the statement.

THE GREEK WRITERS OF THE EASTERN EMPIRE.

And now begins that long and dreadful epoch in the history of mankind when civilization was almost overwhelmed in the slowly crumbling ruins of the Roman Empire. Julius and Augustus Cæsar, in extinguishing the anarchy of the last days of the Republic, extinguished with it much of that burning fire, the love of human liberty, which has always blazed high in lighting the progress of civilization. Tiberius, Caligula, Claudius, Nero, Domitian, spilled the best blood of patrician Rome and demonstrated the horrible evils of a despotism under weak and wicked men. Nerva, Trajan, Hadrian, the Antonines demonstrated the enormous but temporary advantages to mankind of a despotism under virtuous and capable rulers, but by the time they had passed away, the virtue, the sense of responsibility, the power of initiative, had long since perished. Anarchy and ruin began to spread over the world, and the powers of darkness, oriental sorcery, the incantations of ignorant priests, the vulgar fanaticism of a nascent religion with all its superstitious dross, unrefined and unrestrained, held high carnival in the temples of science and the advance in the art of medicine ceased, and for many hundreds of years the best we can say of medical writers, such as Oribasius, Ætius and Paulus Ægineta is that they copied with tolerable accuracy from the writings of others, intruded few of their own ideas and the admission to their pages of incantations, the descriptions of amulets and cabalistic figures, the recommendations of Chaldean drugs are no more than the perusal of the history of their times should lead us to expect. Attempts were made to check this tendency towards magical therapy. Thus Serenus Sammonicus,*

Sorcery.

* Serenus Sammonicus was a firm believer in the magical efficacy of the triangular arrangement of the word *Abracadabra* written on a piece of paper folded into the form of a cross, tied up in a piece of linen cloth and placed over the pit of the stomach, to be worn nine days, and then before sunrise cast over the shoulder into running water.

the elder, was put to death by the orders of the savage Caracalla (211 A. D.) because he recommended amulets as remedies for intermittent fever (Sprengel). He or his son wrote a medical poem (Edit. Ackermann) in which, among numberless other remedies, he advised the application externally by friction of bull's grease or bear's grease to the neck in cases of sore throat, besides the popular prescription of vinegar as a gargle. Such remedies are still popular ones on every country hill side.

Constanti-
nople.

Constantine founded his great city at Byzantium and moved thither the capitol of the world* (330 A. D.). Julian the Apostate, his grandson, in his attempt to revive the old pagan religion engaged also in the more laudable endeavor to resuscitate the learning of the ancients. Oribasius accompanied him in his campaigns in Gaul before his accession (361 A. D.) to the throne of Constantine, and to him was delegated the task of collecting and epitomizing the works of former masters in the art of medicine. The works of Galen are the chief sources from which he made his compilation, but unfortunately, unlike Cælius Aurelianus and Paulus Ægineta and indeed Galen himself, Oribasius only reveals to us knowledge of the diseases of the upper air passages which is accessible to us at its source. There is scarcely a passage of any importance concerning the nose and throat which we have not already noted in the works from which this author drew his information.

It was in vain that Julian in his short reign attempted to revive ancient learning. Succeeding rulers of a grovelling despotism, although themselves occasionally enlightened and virtuous, were unable to bring back the old free spirit which produced the age of Pericles and the era of Augustus. I may again quote the remarks of the sententious Gibbon: "The subjects who had resigned their wills to the absolute commands of a master, were equally incapable of guarding their lives and fortunes against the assaults of the barbarians, or of defending their reason from the terrors of superstition." The Roman world was divided at its line of natural cleavage between the oriental and the occidental races of mankind. The Eastern Empire lived many centuries at Constantinople in the reflection of the light of the old world of Galen and Hippocrates, but it was around the western shores of the Mediterranean, as formerly along the coasts of the Aegean, that civilization was, after many hundred

* Christianity began in Gaul in the middle of the second century, in the time of Galen, Lyons having the first church, and so rapid was the spread of the new faith that two hundred years later Constantine the Great found it to his interest to embrace the forms of Christianity as his ostensible faith and to free the church from taxation.

years, again to assume a new life and a new vigor. On the death of Theodosius (395 A. D.), the last great Roman emperor, the mighty fabric fell apart forever, and under Honorius and his equally impotent successors, after the death (408 A. D.) of Stilicho, the great commander, the Western Empire was deluged by the hordes of Goths and Visigoths, by the Huns and Vandals, and anything like medical learning utterly perished with the other arts from that part of the face of the earth. The barbarians were converted to Christianity, and their monks, in the search for means of saving their souls from eternal torment, found it necessary to study the Holy Scriptures. Their rude chieftains in their search for methods of legal procedure and orderly administration, found it necessary to study the codes of Roman law. These circumstances finally brought about their familiarity with Latin and Greek literature. Virgil, Cicero, Livy, contributed to the amelioration of their manners and the expansion of their intellects, while Galen, Pliny, and Celsus eventually transmitted to them the seeds of medical science, which had matured in the old civilization, and had been almost lost in its annihilation. Cassius Felix was a medical writer who is supposed to have lived in the fifth century. His book,* as he confessed, was mostly made up of extracts from the earlier Greek writers. He thus speaks of what is apparently diphtheria.

“Ulceration of the fauces, if accompanied by acute fever in sickness, is found to be very bad and fatal, especially if it has begun with severity. There is moreover another inflammation besides the acute fever, which forms in the deep recesses of the mouth white or black, or rather dusky gray patches, which they call tephros (ash colored). It is usually called by the Greeks, Aphtha, which we call ‘coction’ of the mouth. And it is worse, even deadly, in young nursing infants on account of the tender age.” Diphtheria.

There is no mistaking this blending of aphthous sore mouth with true diphtheria.

The Eastern Empire preserved the vestiges of Greek learning, all but suffocated by the sorcery and witchcraft which apparently have always found such a fertile soil beyond the Hellespont. Nemesius, a bishop of Emesa in Syria, lived during the reign of Theodosius (376-395 A. D.) and wrote a book on the “Nature of Man,” in which the old critics, envious of the fame of Harvey, used to pretend to find the discovery of the circulation of the blood. In this book there is a chapter on the respiration, and in it we find the author The Eastern Empire.

* Cassii Felicis De Medicina (Edit. Val. Rose).

describing the larynx under the name of the bronchus, and following Galen in saying it is made up of three cartilages. It is Marcellus, very aptly called "Empiricus," however, who best illustrates the condition of medical learning at this time. He was a Gaul, born at Bordeaux, and though a high officer of Theodosius and his son Arcadius, exhibits, as Sprengel remarks, the soul of a slave in his works, recommending certain remedies because they were used by the Diva Augusta or the Diva Livia. His work "De Medicamentis" is said to have been much mutilated by later editors. Chapter X deals with the diseases of the nose, coryza, polypus, ozena, nose bleed, or rather with their treatment; for few writers after Galen devote much space to anything but the transcription of multitudinous formulæ. We will not pretend to mention the innumerable drugs, but we note that he recommends the prescription of Pliny that a man whose nose stinks should kiss the nostrils of a he-mule, and if the patient is a woman she should kiss the nostrils of a she-mule. Besides drugs which are orthodox now, all kinds of stercoraceous applications are recommended. When the nose is bleeding it is helpful to say three times in the ear of that side some unintelligible jargon. However much we may have to criticise in Marcellus, there is one axiom which he lays down which is not always found in preceding authors and is often disregarded by his successors. In his chapter on affections of the throat, he says: "For a swelling of the fauces and of the palate everything used in the prescription should have no irritating quality," but the very efficacious prescription which follows contains the juice of sour grapes—Sprengel surmises, because the Latin word *uva* means both grape and uvulitis; but we have seen that the juice of unripe fruits was a favorite prescription for this affection among both the Hindus and the early Greeks. This, however, is his incantation for pain in the throat, which he who suffers should sing to himself: "Crissi crasi, cancrasi—put the hand on the throat and repeat it three times." Besides the usual inevitable swallow prescription of the ancients we find also this remarkable modification of it. "This cure will help one suffering with chronic sore throat. You must shut up a live swallow in the cavity of an African shell and this being tied up in the linen cloth of Egypt, you shall hang it around the neck and on the ninth day you will be free of your trouble." And this is another elaboration of the swallow prescription apparently derived from Dioscorides: "But especially against Synanche it is useful if you will take young swallows alive in the nest, and will burn these alive so that a powder is made from them (their

Incantations
and Amulets.

ashes) on the day of Jupiter in old moon, but look to it that you find unequal numbers* in the nest and that you burn as many as there are, and you will give this powder mixed up with warm water as a drink, and with the finger covered with the powder you will touch the place of the synanche from the inside. You will greatly admire this prescription." And then come some more incantations, long and involved. As an amulet some Greek jargon was to be written on a paper which was to be wrapped in linen and hung around the neck for a sore throat. Another mysterious formula was to be used in the same way for a bone in the throat. While I have not exhausted Marcellus' savory pharmacopœia in any of its branches it is understood, of course, that these selections are made from many others of a more rational nature which have not even the virtue of originality nor the interest which always attends the mysterious in therapeutics. Indeed, to do him justice, he only speaks of the incantations, as a rule, after mentioning many of the routine prescriptions which are found in the writings of an earlier and a happier age.

As we have seen there was an interval of two hundred years (660-460 B. C.) between the introduction of written records into Greece and the birth of Hippocrates. This doubtless included that period when the record was engraved on the column of the temple of Æsculapius at Epidaurus of a sacred dog curing a cervical tumor by licking it. From the birth of Hippocrates to that of Galen, six hundred glorious years of medical progress intervened. We have seen the high state of anatomical knowledge revealed in the works of Galen. From the death of Galen to the time of Marcellus approximately another two hundred years had elapsed. The holy dog of Epidaurus finds a mate in the live swallow of Marcellus. "Facilis descensus Averno." As illustrative of the times and as containing a matter of some interest to our subject, I again quote from a page of Gibbon (III, Cap. XXXVII). A war had been raging in Africa between the Arians who denied, and the Catholics who upheld, the Trinity. It resulted in the discomfiture of the latter (530 A. D.)†.

* Terna tibi haec primum triplici diversa colore
Licia circumdo, terque haec altaria circum
Effigiem duco; *numero deus impari gaudet.*

—Virgil Eclogæ VIII, 73-75.

"For there's luck in odd numbers, says Rory O'More."—Sam'l Lover.

† The motto of the Church later, "Ecclesia abhorret a sanguine," was hardly applicable to this period. Macchiavelli referring to these African religious troubles in his *Istorie Fiorentine*, says: "Vivendo adunque gli uomini intra tante persecuzioni portavano descritto negli occhi lo spavento dell' anime loro."

The men living then amidst such persecutions carried written in their eyes the terror of their souls.

"A military count was dispatched from Carthage to Tipasa; he collected the Catholics in the Forum, and, in the presence of the whole province, deprived the guilty of their right hands and their tongues. But the holy confessors continued to speak without tongues; and this miracle is attested by Victor, an African bishop, who published a history of the persecution two years after the event. 'If any one,' says Victor, 'should doubt of the truth, let him repair to Constantinople, and listen to the clear and perfect language of Restitutus, the sub-deacon, one of these glorious sufferers, who is now lodged in the palace of the Emperor Zeno, and is respected by the devout Empress.' At Constantinople we are astonished to find a cool, a learned, an unexceptionable witness, without interest, and without passion. Æneas of Gaza, a Platonic philosopher, has accurately described his own observations on these African sufferers; 'I saw them myself; I heard them speak; I diligently inquired by what means such an articulate voice could be formed without any organ of speech; I used my eyes to examine the report of my ears; I opened their mouth, and saw that the whole tongue had been completely torn away by the roots; an operation which physicians usually suppose to be mortal.' " The operations now done for the extirpation of the tongue have proven that the tongue is not the indispensable organ of speech, but what would Galen or Æneas say if they should now be shown that the larynx is not the indispensable "instrument of the voice?"

Ætius.

Ætius is said to have lived as a medical officer of the court at Constantinople about the middle of the sixth century. He was an Asiatic of Amida in Mesopotamia. After Oribasius, he was perhaps the best of those who transcribed the works of Galen and the older writers. There is a great deal in his works (The Tetra-biblion) concerning the nose and the throat, but very little we have not met with elsewhere. Uvulotomy and tonsillotomy and the incision of a quincy are the surgical operations described. He warns against the dangers of secondary hemorrhage in tonsillotomy and directs that only that part of the gland which projects shall be cut off. If even a small portion of the normal underlying tissue is removed there is danger of hemorrhage. He was familiar with diphtheria and with adhesions in the larynx resulting therefrom, or possibly he refers only to the acute stenosis. Alum, nutgalls, mercury, besides bryonia, and many other vegetable and mineral astringents and emollient drugs are recommended by him. He fully equalled Marcellus in stercoraceous pharmacology. Incantations are less numerous perhaps, but not by any means

absent from his writings. He recommends the use of forceps in extracting bones and foreign bodies from the tonsils. When they were in the gullet, the patient swallowed a sponge with a string attached to it, by which it was then hauled up. For this trouble he also advises the repeated swallowing of bread boluses. It is said the following is the first mention of the Savior in medical writings:* "Moreover for the removal of those things which are stuck in the tonsils, immediately take a seat in front of the patient and command him to harken to thee, and thou shalt say: 'Come out, bone' (if indeed it is a bone or a straw, or whatever it may be), 'in the same way as Jesus Christ raised Lazarus from the grave, and in the same manner as Jonah came from the whale.' Then seizing the patient by the throat, exclaim: 'Blasius, the martyr and servant of Christ, says come up or go down.'"

This must have been excellent treatment for *globus hystericus* among the faithful.

Shortly after Aetius, lived Alexander to whom the surname of Trallianus is given, he being one of the five talented sons of a citizen of Tralles. He was the brother of Metrodorus, the grammarian, and of that Anthemius who was the architect of the great church, now the mosque of St. Sophia in Constantinople, which was built (532 A. D.) by Justinian and his consort, the fair Theodora, the licentious Cyprian prostitute who disgraced even the stage of Constantinople before she sullied the much-stained purple of the Cæsars.† Although there are many instances of thaumaturgy in his works, Alexander Trallianus practiced at Rome with honor and profit, and was perhaps the most enlightened physician and the least tainted with superstition of any who had succeeded Galen, but while he has written chapters on the diseases of the nose and throat, there is nothing in them to especially arrest our attention. Of a very different character was Sextus Placitus Papiensis, who outstripped even Marcellus and Aetius in the use of the viscera of animals and equalled them in other departments of Chaldean pharmacology. (Vid. Edit. Ackermann.)

Theophilus, a colonel of the guard under Heraclius (610 A. D.) seems to have been one of the very few medical writers who, in copying‡ from the works of Galen and others, troubled themselves with transcribing any of the anatomy or physiology or semeiology, of which they were in such need. Even he is very inexact. The

Olfactory
Nerves.

* Tetrab. II Sermo IV, Cap. L.

† Gibbon: "The Decline and Fall of the Roman Empire," Vol. IV, Cap. XL.

‡ "De Homin. Fabric.," Lib. III, Paris, 1555.

teleology so prominent in the work of Theophilus is by no means absent from that of his great predecessor, Galen, but the former wishes to explain every function in a manner tending to the glory of God, and he remarks upon the use of the epiglottis in protecting the larynx, that if a crumb fall in it, owing to the lack of proper action on the part of the epiglottis, the patient is suffocated, which is a gross exaggeration of even Galen's remarks in the same vein. His ideas of the purposes of the Almighty in perforating the dura mater and the cribiform plate of the ethmoid would hardly be orthodox to-day, illustrating how dangerous are dogmatic statements outside of the domain of theology. The only advance over the ideas of Galen which I am able to note in Theophilus is the point to which several historians have drawn attention. He accepted the Galenic and Hippocratic idea of air inspired and excretions drained through the perforations in the cribiform plate. He also supposed that through the perforations go the odorous particles. It is perfectly evident that he recognized* "the first pair of nerves as starting from the anterior ventricles of the brain and going to the foramen of the nose on each side, on account of which the brain perceives odors," but as the presence of the nerve fibres in the perforations would be inconsistent with the idea of their patency, we must conclude that Theophilus knew nothing of the distribution of the olfactory twigs. As his was a text-book in the schools of the præ-Renaissance period, this interpretation would certainly have been recognized if justified by the text.

Neither the Pandects or legal reforms of Justinian, nor the virtuous reigns of Tiberius II and Maurice (578-610 A. D.), were of avail in arresting the degradation of the Empire of the East. Justinian abolished the philosophical school of Athens and the consulship of the old Roman regime, but they were long since become mere shadows which were brushed away without harm and without profit to the world. What barbarians had spared the suicidal fanaticism of the despicable Christian citizens of Constantinople, or their equally cowardly and incompetent rulers, destroyed. Even under the great Constantine, every manuscript that could be seized was forthwith destroyed if it contained anything of pagan learning.

* See the 1555 Paris edition. The Greek text is so antiquated that I am compelled to judge from the Latin translation of the passage which occurs at page 67.

Theophilus was one of the medical writers whom it was necessary to study and to teach at the University of Paris when it took its rise in the thirteenth century. (Sprenkel.) It may be surmised that this choice was due rather to the theology than the physiology of his works.

Under Heraclius, whose victories shattered the resources not only of the hostile Persian Empire, but the already faltering forces of his own (610-641), we note the last of the Greek physicians whose works it is worth while for us to review in our search for knowledge of the diseases of the nose and throat. We are indebted to Paulus Aegineta for much which he has borrowed from sources inaccessible to us in the original. It is frequently impossible for us to know how much was original with him.* At least, with the exception of Alexander Trallianus, he is almost the only one after Galen whose works prove their author capable of any originality of his own. Living in the seventh century, he was probably contemporaneous with Theophilus.

Paulus
Aegineta.

We still find aphthæ in infants confused with the graver disorder of diphtheria. He says that the black variety of the ulcers is the most fatal.

As in many of the older writers there is in Aegineta a chapter (l. c. Sec. 19) on the exercise of the voice, not only for strengthening it but as a general exercise of the body. After mentioning the operations for nasal polypi† which we have noted in Celsus and Galen, he remarks: "After the operation, having sponged the parts carefully, we inject oxycrate of wine into the nose, and, if the fluid descend by the roof of the mouth to the pharynx, the operation will have been rightly done; but if it does not descend, it is clear that about the ethmoid bones, or the upper part of the nose, there are fleshy bodies which have not been reached with the polypus instruments." Then follows the description of a barbarous method which, it seems to me, Paulus must have derived from a faulty reading or a misunderstanding of the sponge method of Hippocrates. Certainly nothing of the kind can be found in the Hippocratic treatises, as Adams in his comments intimates, but we shall subsequently find the Arabians sedulously following this plan. They apparently derived much of their knowledge from Paulus. "Taking, then, a thread moderately thick, like a cord, and having tied knots upon it at the distance of two or three fingers breadths, we introduce it into the opening of a double-headed specillum (probe), and we push the other extremity of the

The Knotted
String for
Nasal Polypi.

* Dr. Francis Adams' Sydenham edition of the translated works of Paulus Aegineta, which I follow, contains the translator's comments on the different subjects treated, and these consist mainly of citations from all the ancient writers on medicine, including the Arabians. No better work can be consulted for a review of ancient medical knowledge, although rarely there seem to be grave errors, and the citations do not usually guide one to the quoted sources in the texts of the originals. Unfortunately the text of Paulus does not accompany the translation.

† Book I, Sec. 10.

‡ Book VI, Sec. 25.

specillum upwards to the ethmoid openings, passing it by the palate and mouth, and then drawing it by both hands, we saw away, as it were, with the knots the fleshy bodies. After the operation, we keep the opening separate by means of a tent resembling the wick of a lamp."

As for tonsils* he pulled them forward with a hook "and then we cut them out by the root with the scalpel suited to that hand, called *ancylotomus*, for there are two such instruments having opposite curvatures." He used a tongue depressor in this operation as well as in that of uvulotomy (l. c. sec. 31) but he adopts Galen's caution not to cut off too much for fear of injuring the voice and making the patient liable to inflammation of the lungs. If the patient refuses a cutting operation the rudundant portion may be removed by caustics applied by a special instrument, called "*stapylocaustos*."

In his comments upon the operation of Antyllus for tracheotomy which I have quoted, Paulus makes it plain that he himself was familiar with the operation, for he says (l. c. sec. 33): "We judge the windpipe has been opened from the air rushing through it with a whizzing noise and from the voice having been lost." In closing the wound he freshened the edges of the transverse incision and sewed the skin, but not the cartilage, the latter not being divided.

He follows Hippocrates in his treatment of fractures of the nose, (l. c. sec. 91). We miss all invocations, incantations and amulets from the throat pharmacopia of Ægineta, and he does not lay much emphasis on the Chaldean prescriptions, though they are mentioned with approval (III—27), stercoraceous drugs and the swallow prescription being advised.

THE ARABIANS.

In pursuance of the plan of this book we must now devote an unusual amount of space to the rapid enumeration of the political events which shifted the leadership in science and medicine from the Greeks to the Arabians, events which are connecting links in the progress of civilization.

Greek physicians existed at Constantinople as long as the Christian religion flourished there, but while their works are of interest to the student of the phenomena presented by a dying civilization, they are of less interest to the historian of the progress of medical knowledge. Guizot,† speaking of Roman Gaul in the last days of

* Book VI, Sec. 30.

† "Hist. de la Civilization en France."

the Empire, asserted that "The Library at Constantinople had a librarian and seven scribes constantly occupied, four for Greek and three for Latin; they copied the new works which appeared or the ancient ones which were degenerating. It is probable that the same institution existed at Trèves, and in the larger cities of Gaul." Notwithstanding periods of vigor exhibited by the Eastern Empire, notwithstanding, as Freeman declares, many of the Emperors were great conquerors and rulers who beat back their enemies on every side, and made conquests in their turn, although the last Constantine died a death worthy of the first, hopelessly battling for his empire in the breach of the city wall, notwithstanding all these things, learning did not send forth any new shoots, and Gibbon sums the matter up thus: "They read, they praised, they compiled, but their languid souls seemed alike incapable of thought and action." Finally, their political existence sank to the level of their civilization. The walls of Constantinople protected its feeble inhabitants, except for its conquest by the crusaders, for more than a thousand years after its impregnable situation had been selected and its defences constructed by the foresight and energy of the great Constantine. At last it fell (1453) before the conquering Turk, as falls every work of man, however wisely built or however stupendous, unless its bulwarks are the continued energy, virtue and intelligence of the people who enjoy its protection.

We have seen how, five hundred years before the Christian era, the great kings of Persia drew their physicians from the Greek schools of medicine. The Alexandrian dynasties had long since passed away, and it is significant to note to how low a level Greek medicine had sunk among the bastard descendants of that noble race to find another line of Persian kings sending Arabian physicians to Constantinople to minister to the many bodily ills of some of the Greek emperors; but it was first through Greek physicians, through the exiles whom the fanaticism of the theologians of Constantinople had driven into Persia, that the Arabs received the first inoculation of the virus of learning. It was through the exiles driven by anarchy and the forebodings of impending ruin, as well as by its culmination that Italy first received the direct impetus from Greek sources which resulted in the Renaissance. From the Nestorians the Arabians not only absorbed profane knowledge, but from them the youth Mohammed on his caravan trips drew the inspiration of his religion. Not only the Nestorians, but still more perhaps the Jews, who taught their religion to both Christ and Mohammed, aided in this transfer of learning to the Arabians.

Four years after the death of Justinian, Mahomet, the only son of Abdalla, was born at Mecca in 569 A. D. Heraclius, after his great victories over the Persians, was weighed down by age and disease, and his empire was exhausted by years of destructive warfare. Therefore the feeble races under the sway both of the Persian and of the Holy Roman Empire of the East were easy conquests for the sturdy Arab. The forces of nature are eternal, their laws immutable, and the results of their activity when surveyed over long periods of time and sufficient expanse of space, appear analogous even to the finite understanding of man. The expansion of the Mohametan Crescent rapidly grew until in a period of less than a century from the death of Mahomet in 632 A. D. one horn rested in the fertile valleys of Spain (710 A. D.) and the other menaced the walls of Constantinople itself. The fanaticism which is easily engendered in the populations of Asia has made it the cradle of religions. The poverty and hardships of the human beings who struggled among the burning sands of Arabia weeded out the weaklings of the race and trained the endurance of the survivors to resist the effects of thirst, hunger and fatigue, and when fired by the visions of Mahomet with the prospects of glory and power and with the hope of the indulgence of libidinous passions both in this world and the next, they swept away the feeble civil power, and with it the babbling theological dissensions of the Christians of Africa and Asia Minor, crossed the Mediterranean and overwhelmed the Goths who had had time to be enervated by the luxury of the fertile plains of Andalusia and Granada.

But from the northeastern confines of the temperate zone in Asia, the Turks, having previously accepted the religion and despised the civilization of the followers of the Prophet, checked the advance of his race. From the northwestern provinces of Europe the Germans and Franks, unsullied by a religion which inculcates the righteousness of polygamy and human slavery, checked the advance of the Saracens at the mountainous line which separates the Spanish peninsula from the rest of Europe. Charles Martel with his stout heart and iron mace annihilated their army before Tours in 732, and eventually they were driven back beyond the Pyrenees to develop a wonderful civilization and to suffer from its luxury and the enervation of the climate, which after nearly eight hundred years made them a prey to the powers of Ferdinand and Isabella (1493) grown to an effective force amidst the more arid and mountainous regions of Aragon and Castile.*

* The Arabs conquered Persia in the seventh, Spain in the eighth and the Punjaub in the ninth century, and finally all India.

We have cause to be grateful not only that the victories of Mahomet produced empires which protected science and letters at Bagdad, Alexandria and Saragossa, but because they shattered the belief of large numbers of European mankind in the vain and presumptuous claims of the Christian ecclesiastics to a monopoly of the favor of heaven, and so perhaps did something to start the idea that the abodes of bliss are not exclusively a private park for the priests and their friends. At any rate they must have suggested the idea that images and relics were as little efficacious in ensuring victory as the gods of the pagans over whose destruction the early Christians gloated.

Julius Cæsar had first, by the incident of war, caused the burning of the Alexandrian library in the Museum. This was later replenished by Anthony in his devotion to Cleopatra, at the expense of the library at Pergamos. Four hundred years later Theophilus, the Bishop of Alexandria, destroyed also the library in the Serapion. His nephew, the saintly Cyril, followed him in the bishopric and added further laurels to the family fame by killing the fair Hypatia with a club. She was a learned pagan lady, addicted apparently to lecturing on theosophy. Finally the remnants of the books in Alexandria, which had survived the vicissitudes of a thousand years, were burned by the Arabians, when they were fresh from the barbarism of the desert, Omar sending word that what was not contained in the Koran was false and what was also to be found in the Koran was on that account superfluous. The great temple of the Serapion, the annex to the Museum, where science had flourished for centuries, with its splendid gardens of birds and beasts and its laboratories supplied with its instruments of precision, were destroyed by the fury, the folly and the fanaticism of man. It has been denied that the Arabians found anything to destroy. However that may be, these fiery fanatics, intent on entering the gates of Heaven, filled with objects of sensual delight, suddenly developed such a love for material science as the world had never seen before and perhaps has not been familiar with since. As Draper says, the Byzantines obliterated science in theology and the Saracens illuminated it in medicine. Vast libraries again were collected at Bagdad and elsewhere in Asia, Africa and Spain. The works of Ancient Greece were translated into Syriac by the Jews and the Nestorians, both of whom, the former for denying and the latter for modifying the Catholic acceptance of Christ, had been persecuted and expelled from the Byzantine and Roman dioceses. A good deal of Chaldean medicine was introduced by them to the Arabs who were at first apt

The destruction of the Alexandrian Libraries.

The Arabian Renaissance.

scholars in these matters. We have seen how its amulets and incantations and its filthy drugs abounded in the later Greek writers. With these things, however, astrology and the germs of alchemy were brought from the plains of Asia, and out of these, aided by the traditions, if not the records, of the school of Alexandria, the Arabs developed the great sciences of Astronomy and Chemistry. While they soon rejected with contempt the belief in incantations and amulets, they persisted in the use of stercoraceous drugs. Unfortunately for medicine they neglected the study of anatomy through the dissection of the human body. In this fact we recognize the influence of their religious scruples in preventing any material advance of rational medicine over the teachings of Galen and Hippocrates; for without this underlying study, medical science comes to a standstill and will ultimately perish entirely, however enlightened its votaries may be in other directions. Indeed, whatever may have been their contributions to other sciences, I confess, after reading something of Arabian medicine, to have been neither edified nor impressed. It would seem that in six hundred years they might have done more when we consider the six hundred years which elapsed between Hippocrates and Galen. We look in vain for any material advance in the knowledge of the nose and throat and their diseases made by the Arabs. It is to them, however, we owe the introduction into our pharmacopœia of the syrups and elixirs, so useful in affections of the throat as vehicles for drugs administered in them, which often derive from the vehicle a reputation quite ephemeral.

The Inferior
Maxilla.

Tracheotomy.

It will be remembered that Galen supposed the inferior maxillary bone was not a single bone, but composed of two halves. This error, according to Sprengel, was pointed out by Abdollatif, who made the discovery by examining with care one of the many heaps of human bones which were so plentiful in the days when religion was propagated with sword and fire; and this was almost the extent of their contribution to the anatomy of the head and neck. They were familiar with uvulotomy and tonsillotomy and the removal of nasal polypi by the barbarous string method of Paulus Aegineta, Mesua using horse hairs twisted into a knotted string for the purpose. Rhazes, also an early Arabian writer (died 923 A. D.), was familiar with these methods. Tracheotomy was known to them only from Aegineta's description of Antyllus' operation. Even Albucasis, a late (died 1122) and perhaps the boldest, certainly the most brutal, of the Arabian operators, knew of no one in his time who had performed it. He had seen a nurse girl who had cut her

windpipe and who had completely recovered when he sewed up the wound. Avicenna (980-1036), the Prince of Physicians and the greatest of the Arabian authors, simply describes the operation according to Paulus, while Avenzoar (died 1161) went so far as to try it on a goat. Avicenna, and many others of the Arabian writers, showed they were practical observers in likening some of the nasal polypi to hemorrhoids and advising the ligature for them. In this they were followed by many of the writers of the Italian Renaissance and even of much later times. Avicenna, whose work was a text-book of almost exclusive authority during the later Middle Ages, describes the anatomy of the nose and throat in a very poor transcription of Galen. He gives, however, a very good description of the disturbances of olfaction, recognizing the two varieties, viz., obstructive anosmia due to nasal stenosis and the essential form due to some central brain lesion.*

The use of the cautery, carried to such great extremes by Albucasis, was a favorite remedy for all sorts of affections. Baas relates† how Mahomet, instead of resorting to a more spiritual and miraculous method, advised a friend suffering from angina that he should have an application made of the actual cautery. Johannus Mesua Damascenus advised‡ the use of forceps for the removal of polypi and afterwards the cauterization of their roots, or else the use of hot forceps, but if this method was impossible he used the horse-hair string. In this author we may find this remarkable recommendation for the cure of inflammation of the palate (l. c. Lib. II, Sect. II—Summa 1, Cap. 2). "The second method of cure is the diversion of the cause, and this is performed in a manner which causes the trouble to shift its seat, in short rubbing of the ears and pulling them forcibly upwards, and the painful stretching of them, and the application of cups to the opposite part. For these things raise the inflammation and bear it upward; and among those things which are useful in the elevation of it is that a handful of hair should be grasped in the hands and the patient told to keep silent. Then put thy feet on his shoulders and drag strongly on the handful of hair, until the skin is pulled up, for by such dislocation will the pharyngitis also be raised." These patients probably complained as do our own that their "palates were down."

The Cautery.

* Edit: Venice, 1562, p. 581 et seq., Lib. III, Cap. 4.

† "History of Medicine," Am. Ed., P. 219.

‡ Opera, Venice, 1589, Lib., II De Aegritud. Narium, Cap. 6.

Some confusion exists among the Arabians as to whether the dung of a white dog or the white dung of a dog, to be obtained by feeding him on bones, was the proper medicament in angina. The swallow prescription is always mentioned in some form.

In removing foreign bodies from the throat Janus Damascenus recommends, apparently as a variation of the sponge method we have noted in Ætius, the tying of a piece of half cooked meat on a string and bringing it up after it is swallowed. Nearly all even of this sort of surgery may be found among the late Greek writers of the Eastern Empire. Guy de Cauliac* refers to Haly Abbas using "un instrument appellé mirror au soleil" or in the Latin edition "speculum ad solem," for opening the nostrils in examining a nasal growth. On referring to the Latin translation of Haly Abbas by Michael de Capella in 1523,† it may be seen that the passages to which Guy apparently refers hardly warrant this rendering. In the work of Constantine, the African, "De Communibus Medico Cognitu," which is said to be an abridgement of Haly Abbas, nothing of the kind is to be found. We may conjecture that Cauliac read the text wrongly or that he had access to others which are not now accessible to us; but at any rate it is evident that Cauliac had some knowledge of such an instrument. Indeed the use of the cautery in the nose from the time of Hippocrates to the present presupposes the use of a tubular speculum at least.‡

From the fact that the processes are occasionally multiple with a common base of attachment and the Greek conception of them was embodied in the name polypus or many feet, we find the mediæval translations from the Arabic converting the name into the word "Scorpio." How accurately this expresses the Arabic word for polypus, I do not know.

Albucasis who used the cautery savagely for almost everything and apparently often at random, recommends burning the skin beneath the eyebrows for a bad odor from the nostrils.§ We may conjecture that this is related to the Libyan custom as related by Herodotus (l. c.) Some of the remarks of Albucasis in regard to operations on the nose and throat may be inserted here as interesting and illustrating somewhat the figures of the instruments taken from Channing's Latin version of his Surgery. The exist-

* Edit.: "Nicaise," P. 328.

† f. 279, col. C., Pract., Liber IX, Cap. 32.

‡ According to Cloquet the speculum of Guy de Cauliac, or Haly Abbas, is figured in "L'Interpretations des Dictions Chirurgicales" which Laurent Joubert printed at the end of his edition of the "Grande Chirurgie de Guy de Chauliac," printed at Rouen in 1615.

§ Channing's Latin translation, Vol. II, P. 35, Sect. 14.

ence of these figures in the original manuscript was one of the forerunners of the introduction of woodcuts,* which antedated the invention of Guttenberg. It must be confessed that Channing's Latin text of Albucasis does not clearly correspond with the figures which accompany it.

“And when glands occur in the throat similar to the glands Tonsillotomy. which occur externally, they are called the two tonsils. When thou hast treated them with those things which I have mentioned and they are not cured, look and if the tumor is hard and of a dark color, of slight sensibility, do not touch them with the knife. And if it is of a red color and the base is broad do not touch it with a knife for fear of hemorrhage, but delay until it has ripened, for then thou canst perforate it or it will break of itself. But if it is of white color, round and has a slender base, this is the kind which is suitable and thou shouldst cut it. Thou shouldst examine before operation if the swelling has entirely disappeared or in what manner it has diminished. Then thou seatest the patient in the clear sunlight and takest his head in thy lap and openeth his mouth and taketh the instrument in thy hands which will depress his tongue, a concave instrument somewhat of this form (Fig. 1); thou canst



Fig. 1.

make it of silver or of brass; it should be thin like a knife; with this the tongue is depressed and the swelling will then be apparent to thee, and let thy vision fall upon it. Then thou shalt take a hook and fix it in one tonsil, and with it thou shalt draw it out as far as possible; but of course thou shalt not draw out with it any of the membranes. Then thou shalt incise it with an instrument of this form (Fig. 2.) It is similar to a forceps except that the ends

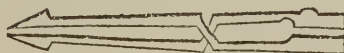


Fig. 2.

are curved and the edge of each is opposite the other and is very sharp. It is made from Indian or fine Damascus iron. But if this

* The earliest woodcut remaining to us dates from 1423, but there is ample evidence of the existence of the art long before this, in Venice and elsewhere.

instrument is not at hand thou mayst cut it with a knife with this shape (Fig. 3)—sharp on one side, less so on the other. And some-

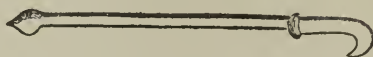


Fig. 3.

times other tumors than tonsils grow in the mouth. Thou wilt cut these out as thou doth the tonsils.” (Liber II, sec. 36.)

A Post-Nasal
Tumor.

In short they were to be cut out with scissors or a sickle-shaped knife. Then follows the very interesting report of a post-nasal growth. “Once I treated the tumor of a woman which had grown in her throat. It was of a dusky color and not very sensitive. The woman was almost strangled, and from the constriction of the passage breathed with difficulty, and she was prevented from drinking or eating anything, so that she was reduced almost to the point of death, and she had been in this condition a day or two. The tumor so projected forward that two branches of it protruded from the nostrils. Therefore with the greatest promptitude I hastened to fix in one of these a hook and dragged on it, and that whole portion was pulled forward. Then I cut it off where I had pulled it out at the nostrils. Then I did the same for that which projected on the other side. Then I opened her mouth and depressed her tongue. Then I fixed a hook in the tumor itself and cut off a part of it and only a little blood came from it, and the throat of this woman was free and she immediately drank water. Then I offered her some food. I did not cease to cut pieces from this tumor for a long time, but the new growth filled the place of the excised pieces until her patience and my own was exhausted. Wisely then did I act, and I cauterized the tumor up in the back of her throat and thereupon it did not recur. Then the woman left me and I know not what God did with her after me.” These quotations, as literal as possible, from Channing’s deplorable Latin, will indicate the manner of man this modest Arab was, and better than words of mine will portray the state of laryngological practice among the Arabs. It may be profitably compared with the procedures of Hippocrates in cases of nasal polypi, in order to realize the backward steps taken in 1500 years. Albucasis describes about the same methods of treatment for uvulotomy, following the injunctions of Galen. His directions for removing foreign bodies are much the same as those of the later Greeks. His remarks on laryngotomy I have referred to above. Love of the hot iron and dread of the knife

characterized Arabian surgery, and they seemed more afraid of drawing blood than of inflicting atrocious pain. In all this we behold the result of defective anatomical knowledge.

And these were the votaries of science who guarded the portals of medicine for six hundred years. In other departments doubtless their achievements were great, but despite the great debt modern civilization owes to them, medical knowledge languished and we have only to be thankful that it did not entirely expire, that it was not wholly given up to amulets and charms and stercoraceous drugs, that mysticism and the occult, which we still have with us in the Faith Cure and the Mind Cure and all that foul brood of Darkness, did not in this period of weakness, when anatomy had perished entirely, overwhelm the Art of Medicine as it did in India. The spectre Orientalism still haunts us. It is a vague disembodied spirit, but it is the ever present foe of civilization.

For several centuries it was through the Arabs only, or perhaps it is better to say, chiefly, that Europe knew anything of the medicine of Hippocrates and Galen, but when the better editions of the early Greek writers came into the possession of the Italians, it was soon perceived how gross had been their rendering of them.

THE PRAE-RENAISSANCE PERIOD.

To the superficial reader of mediaeval history the causes of the Renaissance may seem mysterious and puzzling. It requires, however, only a moderate amount of reflection and study to understand that the infusion of the vigorous new northern blood into that which flowed in the veins of the old races, dwelling around the Mediterranean, produced a new and, from the cross breeding, a more vigorous race of men. Amid the ruins of Rome, ignorance, superstition and fanaticism, the interminable wars, the terrible devastating plagues had induced a grovelling misery and a poverty, for many ages foreign to the sunny slopes of the Cis-Alpine hills and fertile valleys of Italy. The primeval forces of Nature thus working through evolutionary laws again produced in this garden spot of the world a race of men from which the weak in body and mind had been weeded out. The soil was ripe for the seeds wafted from other civilizations now rapidly approaching collapse.

Daremberg* does not succeed in convincing us that much if anything that may be called medical learning really was to be found in Europe in that period which lies between the deluge of

Learning in
the Middle
Ages.

* "Hist. des Sciences Med." 1870, Vol. I, p. 277.

the barbarians from the north and the introduction of Arabian science. The ruthless hand of Gregory the Great (Pope 590-640), had long since demolished the library on the Capitoline hill which the munificence of Augustus had founded. His motto: "Ignorance is the mother of devotion," supplied then a sufficient defense as it now furnishes an ample explanation of the deed. He himself was one of the most learned men of his times, but the intellectual treasures of the Ancient World had been lavished on his barbarian soul in vain. Some manuscripts, it is true, with other weaklings had found a refuge in the hidden recesses of the cloisters of sordid monks, who sought as eagerly for safety in this world as for Paradise in the next, but these manuscripts escaped rather through the negligence than the respect of the priestly rabble.* Famous schools, it is true, existed at Monte Cassino, Amalfi, Naples and Salerno during the Middle Ages, but what their learning consisted of it is impossible to know. Professor Ordonaux' elegant edition of the *Regimen Salernitanum* gives a hint of it in many places. We may easily form a picture of a circle of lusty, merry, dirty monks sitting around a rough table, and with beer mugs and drinking horns held on high roaring forth the refrain:

"Si tibi serotina noceat potatio vini
Hora matutina rebibas, et erit medicina."

The origin of the School of Salerno is unknown, but there is little doubt that such learning as there existed was derived through the Jews and possibly through other sources from the Arabians. It was there, or at Monte Cassino (1086), that Constantine, an African prelate, after a sojourn of thirty-nine years among the Arabians, where he is said to have been a pupil of Avicenna, wrote his plagiaristic works which he did not dare, and perhaps did not wish, to credit to the pagans Hippocrates, Galen, Avicenna and Haly Abbas, from whom everything in them of value was miserably transcribed. By such means, at first secretly, then openly, the knowledge of the Arabs found its way into Europe through Italy and Spain, and this process was greatly facilitated by a few enlightened individuals, who, like Constantine, had spent their youth at the courts of the Arabian monarchs.

* Daremberg: "Hist. des Sciences Med." Vol. I, p. 256, quotes from a mediaeval author as follows:

"Clerici nostri temporis potius sequuntur scholas Anti-Christi quam Christi, potius dediti gulæ quam glossæ: potius colligunt libras quam legunt libros; libentius imitantur Martham quam Mariam."

Averrhoes introduced skepticism, "le flambeau de la science," as some Frenchman calls it, to the Arabians and was duly hated by the Mahometan and Christian dogmatist alike, but this was a mere undercurrent in Christian Europe for a long time, too feeble to be perceived amidst the robust but grovelling superstition of the times. Pope Sylvester II had been educated at Cordova, spoke Arabic like a Saracen, and had been elevated (999 A.D.) by the politics of the time to the chair of St. Peter as a creature of the Emperor Otto III. The influence of the Arabians on the science of the Middle Ages may be strikingly witnessed in the *Inferno* of the pious Dante where Hippocrates and Galen are joined to the shades of Avicenna and even to that of the hated Averrhoes. (Canto IV l., 144.)

Nevertheless, as Guizot says, it is difficult to imagine what would have happened after the downfall of the Roman Empire in Europe if the Christian Church had not been organized. It stepped in first as the handmaid and then as the mistress of the civil power, and thus by furnishing some sort of authority, having its real foundation deep in the souls and superstitions of man, brought order out of chaos. It was Gregory the Great who was active in the destruction of learning in Italy, but who nevertheless was a great power of cohesion where all things tended to disruption. Gregory VII was the great Hildebrand who, when elected pope, substituted ecclesiastical for imperial tyranny, and in 1077 King Henry of Germany waded barefooted through the snow of the Alps to humble himself at the feet of the pope at Canossa. Again the civil power gained the ascendancy under that liberal man of genius, Frederick II (1194-1250), king of the two Sicilies, who had imbibed much learning and freedom from superstition by his Arabian education and affiliations. He rendered the greatest service possible to the art of medicine by his decree ordering the dissection of the human body.

Influence of
the Church.

As has been said Greek men of learning, rats from a sinking ship, flocked into Italy with their precious manuscripts from Constantinople, many coming before the crisis and many escaping at the final shipwreck in 1453. They found for themselves and their learning an asylum in Italy, where the great families of the Medici, the Farnese, the Este, the Colonna, the Gonzaga, enriched and enlightened for the most part by maritime trade, and urged by the influence of Petrarch, gave them a welcome and an enthusiastic reception which fanaticism had denied the Arabians. But Petrarch's welcome extended rather to other branches of let-

Influence of
the Greeks.

ters than to medicine, whose practitioners he lashed with a fierce satire from which Molière later drew his inspiration. A hundred years before the fall of Constantinople, on hearing of the loss at sea of a vessel carrying a valued and a learned Greek friend, Petrarch's first thought was to inquire if perchance the surviving sailors had not saved some Greek or Latin manuscripts which might have been among his effects.

It has been noted that from the time of our first knowledge of the School of Salerno to this epoch medical learning was derived almost wholly from Greek sources through the Arabians. This prae-Renaissance period of perhaps 300 or 400 years includes Henri di Mondeville, Mondino di Luzzi, Guy di Chauliac, Arnold di Villanova, Petrus d'Abano, Brunus, and others, the first fruits of the seeds of learning of modern Europe from the old stock of Hippocrates and Galen.

Influence of
the Crusades.

Even the most cursory review, such as this professes to be, of the salient influences in the spread of knowledge can not ignore the crusades. As two thousand years previously the Grecian hosts are said to have attacked the walls of Troy, the holy city of Jerusalem was the scene of another furious onslaught of western brute strength on an eastern metropolis. Homer draws a more artistic and vivid, but no more fearful picture of the sack of Troy than later historians do of the capture of Jerusalem by the crusaders. Returning, if his thirst for blood and holy relics was not satiated, the crusader at least brought with him, as doubtless did the ancient Greeks, more enlightenment than he set out with. The survivors of the mighty hosts brought with them back to their homes not only the bones of the saints and the splinters of the true cross, but a broadened knowledge of men and things. The aggregations of such large bodies of men, under the necessity of acting more or less harmoniously, laid the foundation for the spontaneity with which various movements of European social, political, and religious activity subsequently occurred. Different nations and different conditions of men became, to some extent, mutually helpful in their various struggles towards liberty with that ecclesiasticism which had fattened on their estates and their temporal power during the absence, which the priests had urged upon them.

Italian
Science.

"The eagerness with which the Arabians had collected the medical works of the Ancients hardly surpassed the zeal with which the Italians of the Fifteenth Century pursued the same course, and Cosmo Medici may be compared in this respect with Khalif Mamun, but let us mark the difference. The Arabians translated,

they often even destroyed the originals, and their own ideas so permeated the results that they theosophized Aristotle, turned astronomy into astrology and made use of these in medicine. The Italians on the other hand read and learned. The true Aristotle eventually crowded out the Arabian*; out of the unaltered writings of the Ancients they learned their Science, Geography directly out of Ptolemy, Botany out of Discorides, the Science of Medicine out of Galen and Hippocrates."†

The Ancients not only supplied them with knowledge as they did the Arabians, but they inspired them with such a thirst for it that their own authority in science was soon destroyed, something which had never happened with the Arabs. The popes and the clergy in fostering at first these beginnings of intellectual life were conjuring up Genii which in a few centuries were to rob them of all but a vestige of their power, riches and veneration. It is this progressiveness which in medicine distinguished the European from the Arabian civilization.

Although the Greek physicians from Constantinople brought their language and their manuscripts, they themselves had perhaps directly little influence. Their scientific attainments were insignificant as compared to the Arabians. They were the unworthy custodians of the relics of a former civilization, the puny descendants of a once vigorous race. They were full of lies, superstition and effrontery, and they imposed on the credulity of those still more benighted than themselves, if we are to believe what Petrarch says of them. "To lie like a doctor," he declares was a proverb in his day. This depravity is easily perceived in the counsels of worldly wisdom, which the prae-Renaissance medical writers scattered so plentifully through their works. Henri di Mondeville or Hermondeville in the frank discourse of his surgery is very amusing, but he, quite as much as Boccacio (b. 1313) and later Benvenuto Cellini (b. 1500), displays the general disregard of ethical or moral considerations in his relations to his patients and confrères.

In the history of medicine, keeping step as it does with the history of civilization, it is a long, dreary stretch of a thousand years from the sack of Rome by the Vandals (455) to the fall of Constantinople by the Turks (1453), and even Sprengel, the most

* Guizot (*Hist. de la Civilization en France*. Edit. 16, T. 12, p. 182) asserts positively that the knowledge of Aristotle was not, during the Middle Ages, derived exclusively from Arabian sources. Alcuin did much in the time of Charlemagne to keep alive the acquaintance of the learned with the works of the Ancients.

† Ranke: *Geschichte der Papste*, Bd. 1. Cap. 2.

phlegmatic of historians, breaks into pæans of rejoicing when he arrives at the Renaissance. In medicine this properly begins with Berengarius, or Berengar del Carpi, but there is a prae-Renaissance period, to which I have referred above, which it will be interesting to glance at for information as to the nose and throat.

Among the Salernitan verses from Prof. Ordonaux' translation we may select "De Raucidine Vocis" or Hoarseness:

" Oil and raw apples, nuts and eels, 'tis said
With such catarrhs as settle in the head,
And leading to a long intemperate course
Of life, will render any person hoarse."

And the cure for it is

"DE REMEDIIS CATARRHI."

" Fast well and watch. Eat hot your daily fare.
Work some and breathe a warm and humid air;
Of drink be spare; your breath at times suspend,
These things observe if you your cold would end."

" Si fluat ad pectus, dicatur rheuma catarrhus,
Ad fauces bronchus; ad nares esto coryza."

It is singular that, in quoting from the school of Salerno, we so frequently offer evidence of their convivial habits, snugly ensconced as they were in their cloisters sheltered somewhat from the stormy experiences so abundantly detailed in mediaeval history. *Johannis Platearius** (1225?), relates that his father cured a "certain Salernitan who was playing at dice, and suddenly felt that he was attacked by 'squinantia.' When he began to be suffocated and had showed the painful place with his finger, as he was unable to speak, my father, of blessed memory, a remedy having come to his mind, placed a wedge between the patient's teeth, and forced into his throat a piece of wood and the skin of the aposthume was ruptured, and thus, blood flowing in great quantity, he was relieved."

"Squinantia."

Apropos of this word "squinantia," we may note an instance of transformation through the vicissitudes of time, language and translation from the technical Greek to the English vernacular. We have seen how in the time of Aretaeus and Galen they were disputing as to the etymology and significance of the words

* *Salernitani excellentissimi practica brevis: De Squinantia f. 177 b. Edit., 1497. Practica Jo: Serapionis dicta breviarium.*

kynanche and synanche (*vid.* pp. 62 and 77). How this word was translated into the Syriac and Arabic dialects I am not sufficiently versed in Oriental linguistics to know, but when it emerged into Mediaeval Latin it was "squinantia," a term unknown to classical Latin. In the English of Huxham,* not a bad example of a classical English medical writer of the eighteenth century, we find the term changed into "squinzy," and from this to the familiar *quinzy* is but a step.

Gurlt (*Geschichte der Chirurgie*) quotes from Brunus de Longobardus, who ended his work in 1252, a passage by which we may see the inane confusion into which this old dispute of the Greeks had thrown their witless heirs:

"Nam hujus apostematis tres sunt species, quarum una dicitur quinantia—alia dicitur sinantia—alia dicitur squinantia." He tries to define the difference between these, but he leaves the modern reader in a fog, and there can be no better illustration found of the paucity of original thought and observation, and even of feebleness of imitation which is so characteristic of prae-Renaissance medicine. In the *Glossulæ Quatuor Magistorum* the same differentiation is adopted by Rolando.

A still further example of obfuscation and pedantry may be obtained from the same source. Lanfranc was a surgeon who died in 1306, and this is his idea of the topography of the neck; it is untranslatable:

"Quidam tamen faciunt differentiam inter collum et cervicem; gulam et guttur; quæ tamen omnia sub colli nomine comprehenduntur multotiens. Intra collum et gulam ab intra locatur meri, sive ysophagus—ex parte vero interiori versus gulam locatur canna pulmonis—super has duas vias et epiglottus ex tribus cartilaginibus compositus. (The epiglottis was the usual mediaeval name for the larynx, 'canna pulmonis' for the trachea). Guttur dicitur eminentia epiglotti; et latus gutturis dicitur gula." Arnolfo di Villanova† (1285) speaks of "squinantia" as a throat inflammation "in quodam folliculo quod est inter ysophagum et tracheam." Going back to the first of these writers who drew their knowledge principally from Arabian sources, we look in vain through the ponderous tome of Constantine the African (1015–1087)‡ for anything varying from Hippocrates, Galen and Avicenna except in the

* "An Essay on Fevers, to which is now added a Dissertation on Malignant Ulcerous Sore Throat." (1775.)

† Opera, Edit., 1509, f. 166.

‡ "De Morborum Cognitione et Curatione."

Operation for
Nasal Polypi.

obscurity of diction and the misapprehension of its sense. It is largely a catalogue of drugs including, for the throat, the swallow prescription and the usual line of stercoraceous remedies. The same may be said of Gariopontus (1040). They were Salernitans and the school had then been in existence, for a time under the Saracens, for several centuries. It only formally went out of existence with many other old things in the time of the great Napoleon, but it had begun to decline even in the time of Roger of Parma (1230), and his disciple Rolando, who were the first writers in whom there is any evidence of originality, and this is seldom apparent. From the text of Rolando* we learn that for nasal polypi he at first purged the patient and then "Cum spatumine usque ad profundum evellatur et sagitella inscidatur." The sharp spatula referred to is evidently from Galen. The recommendation for the use of a saw may have resulted from the description of the use of the knotted string in the manner of a saw as described by Paulus Ægineta, just as the latter probably through imperfect manuscripts derived the string operation from the more rational and humane sponge method of Hippocrates. At least in some of the translations from the Arabian books reference to this "sagitella," usually in the way of comparative illustration of the knotted string method, may be found; but Sprengel† says that Rhases recommends the saw as well as the ligature for the removal of nasal polypi. Rolando seems familiar with the knotted string method also, but nevertheless I imagine there is confusion here arising from the transcription.

Tonsillotomy,
Uvulotomy,
Tracheotomy.

Holmes refers to Roger and Rolando as having observed a neoplasm of the larynx. This, when we consider the general state of medical diagnosis in their day, seems very improbable. The passage in the "Glossulæ" to which he apparently refers does not seem to warrant that interpretation‡, but it seems clear to me that enlarged tonsils was the condition the writer had in mind. The last sentence doubtless refers to tonsillotomy. Immediately thereafter follows the reference to the treatment of elongated uvula. For this he had a good deal of faith in an ointment, doubtless carried in the boxes of the peripatetic practitioners of the day, the quacksalbers. This salve was supposed to destroy proud flesh, and cause the growth

* "Glossulæ Quatuor Magistrorum." Edit.: Daremberg, 1854, P. 129.

† "Essai sur la Medecine," II, 337.

‡ Est autem quædam passio que nascitur in gula juxta epiglottum quod dicitur folium (?) que quandoque est una et quandoque sunt due carunculæ tenues et late et modus folii que tracheam arteriam et vocem impediunt; cum vero patiens aperit os ad loquelam, se elevat et foramen tracheæ arterie; cum vero os claudit, subsident, unde patiens vix potest formare aliquod verbum intelligibile. Que passio numquam curatur nisi beneficio cypurgie.

of better. If no other remedy was efficacious the cautery was to be used as recommended by the Arabians and "Ypocras." He quotes Avicenna in a warning to be observed after uvulotomy, clearly derived in exaggerated form from Galen. The patient should not lie on his back, lest epilepsy, apoplexy and paralysis should be caused. He also had reason to recommend as a gargle the water in which a fat hen had been boiled, a prescription which may be found in the Arabian works. Petrus d'Abano* warns against incision of the trachea as dangerous and gives his puerile reasons for the opinion. Arnaldo di Villanova (l. c.) repeats the Arabian hair-pulling formula for relaxed palate, and the fat-hen prescription for sore throat. As for the ridiculous "Lilium Medicinæ" of Bernard Gordon (1285-1307), the title reflecting the stilted style of Chivalry with which Cervantes later played such havoc, this seems an utter annihilation of cerebration. Dyspnea was supposed to be due to "weakness as in children on account of the debility of the nerves and paralysis, on account of spasm and many such things," but he recognizes uvulotomy and hints at the advisability of tracheotomy in very desperate cases. The intractability of chronic hoarseness is expressed, however, in the tersest language, to which modern science could hardly add anything. "Raucedo post unum annum non recepit curationem. Raucedo ex rheumate numquam curatur, nisi prius rheuma curatur." Plat-tearius (l. c.) gave expression to the same opinion. All these authors shared the credulity of their age. In the records of sorcery, so abundant in the Middle Ages, the accounts of cries and coughs and barkings, especially among the hysterical recluses of the convents, were the symptoms of the convulsive spasms of the pharynx and larynx still occasionally seen, and perhaps, as Dupuoy suggests,† prodromata of the more general convulsive seizures. The ignorant credulity of the age was extremely likely to cause the burning of these poor wretches.

But greater men had begun to appear and in Henri di Mondeville and Guy di Chauliac, his pupil at the University of Montpellier, we have evidence of advancing intelligence and knowledge, which manifests itself however chiefly by a better understanding and rendering of Galen and the Arabians. Their productions in their naiveté are amusing, in their form approach somewhat to the standard of good literature, and in their substance are valuable as giving an insight not only into medical

* "Concil. Diff." Edit.: 1522. He lived 1250-1320 A. D.

† La Médecine dans le Moyen Age.

knowledge and ethics, but also to a considerable extent into the spirit and general conditions of the times. There is also to be noted some improvement in the latinity.

Henricus de Amondeville,* as he styles himself, declares in his Proemium that he set out to write his Manual of Surgery in 1306. This is just ten years before Mondino di Luzzi is said to have dissected in public the human body, and it will be interesting to note the advances, small but significant, in anatomical knowledge which are evident in the work of Hermondeville (for thus he is also called at times), over the state of it revealed in the citations I have made. He describes the olfactory lobes, not according to Theophilus, whose description was not noted until recent historians have brought it to light; but according to Galen as a part of the brain and the true organ of smell: "Just in front of these is a certain fossa which is between the two eyes, under the upper extremity of the nose, where the said fossa begins." (He is describing the internal nose). "The reason for the creation of this fossa is twofold: 1. That it may receive the superfluities of the brain, and that they may be expelled through it. 2. That in it the air, carrying a sort of odorous matter, may remain quiet until it is taken up by the organ of smell. From the said fossa spring two canals towards the mouth and the palate through the ethmoid bone. The use of the said canals are threefold. 1. That when the mouth is closed there may be an inspiration of air to the lungs. If this were not so it would always be necessary to keep the mouth open. 2. By blowing forcibly through these the said sieve-like bone (the ethmoid) may be purged of its filthy viscosities. 3. That they may aid in the enunciation of letters."

The description of the external nose which follows is a little better, but while an improvement may be noted over his immediate predecessors, it may be easily seen how much inferior this is to the passage in Galen (Vid. pp. 137 and 142), from which it has been taken, especially in the physiological part of it. The same remark applies to the anatomy of the throat. "From the stomach by way of the—esophagus† there goes a membrane, which surrounds the whole mouth on the inside, and the proof that it comes from the stomach is that when a man is touched under the mouth (in the back of the mouth?) he immediately has

* "Die Chirurgie des Heinrich von Mondeville," edited by Pagel.

† "A stomachio mediante meri vel via cibi, vel ysophago, quæ sunt idem." Stomachus in classical latin usually meant the esophagus, but was frequently loosely applied to the stomach, while meri is apparently an Arabian word adopted into the Mediaeval latin.

a tendency to vomit. Extending into the mouth is the upper end of the esophagus and the air passage which is called the 'canna pulmonis et trachea arteria,' whose opening into the mouth the cymbalar cartilage covers which is the third part of the organ which is called the epiglottis, *i. e.*, the nodule of the throat, which cymbalar cartilage rises up when a man talks and covers very loosely the food way, and when a man swallows food it is depressed and then loosely covers the tracheal artery and the food way remains open, wherefore unless at the time of swallowing it should cover the airway food would enter it, as often happens when, etc., etc."

We meet also with the queer remark of Hermondeville that the flesh of the tongue is white in order that it may change the watery saliva into a color similar to itself. He repeats the mistake of Galen that the lower jaw is made of two bones. Among his therapeutics invocations are occasionally recommended. In all the writers before Vesalius epiglottis was a term applied to the whole larynx, and this and other anatomical terms, as among the early Greeks, were used in a bewildering way when they tried to describe the throat.

We now turn to the great surgeon of the prae-Renaissance period, Guy de Chauliac,* and so far as the nose and throat is concerned he does not differ materially from his preceptor, Hermondeville. He speaks of the ethmoid bone as belonging to the frontal, which he calls the coronal. In it are the holes for the eyes and "les colatoires des narilles divisez par certaine addition ossue en forme d'une creste di geline a la quelle est planté le cartilage qui despart les narilles." (P. 41.) Although Guy has something to say of wounds of the nose and bandaging, he passes over its diseases very superficially, quoting Avicenna that the obstruction of the nose is "humoral, or fleshy, or crusty," the symptoms of which are the inclination to hawk, the impossibility of breathing with closed mouth, tinnitus aurium, nausea; in short, not a bad summary of lesions and symptoms, but not very specific. His treatment was the snuffing up of water impregnated with various mollifacient and astringent drugs. He recommends for this purpose also the urine of camels, having copied this, of course, from the Arabians, who, in their long and terrible journey through the burning sands of the desert, not infrequently were compelled to quench their thirst with it and to perform their ablutions with

Guidi Cauliac.

* "La Grande Chirurgie de Guy de Chauliac—Composée en l'an, 1363." Edit. of E. Nicaise, 1890.

sand. His account of the diseases of the mouth and pharynx are also merely repetitions of the medical writings of the Greeks and Arabians. He quotes from Mesua a description of a canula for cauterizing the uvula, "in the head of which at one side is a fenestrum in which the uvula is engaged; and then through the canula is introduced a hot instrument like a knife and it is incised by cauterizing." He also follows the procedures the Arabs had adopted from Paulus Aegineta, for the tonsils and for foreign bodies, quoting Haly Abbas that if it is a leech in the throat, give onions with vinegar, or pull it off with the forceps. In quinzy the following treatment was used after pus was supposed to be present. Quoting from the practice of his predecessors, he says: "The abscess having matured, they first try to incise it with a lancet, if it is to be seen, and the mouth is rinsed out with parsely or with some other of the usual detergents. If, however, it is so far within as not to be seen, it should be broken with the finger nail or by rubbing with something if possible." We are reminded of the rough and ready operation of the old Salernitan on the dice player. He refers to this remarkable procedure of Roger, which we have noted elsewhere for another purpose. "A half cooked piece of meat should be taken and tied to a long, strong cord, and the patient should be made to swallow it, and while he is swallowing it, it should suddenly be jerked out with violence by the cord, and the abscess thus ruptured. The same may be done with a sponge." This was the way Aetius and the Arabians removed foreign bodies, but certainly there is no lack of originality in this for a tonsillar abscess. Through Avicenna he quotes Hippocrates' intubation process by means of gold and silver tubes for the relief of dyspnea, reproducing the Arabian remarks upon tracheotomy. The same may be said in regard to nasal polypi and ozena. "Of the ulcers which are in the nose, some are without superflous flesh and others with it. * * * One should not despise these ulcers of the nose, since as all say they lead to polypus, and polypus of every kind is pernicious." For them he recommends the process of Albucasis, the knotted cord, etc. "Split open the bone according to the four masters, and burn it."

Botium was the name in the Middle Ages for goitre, and they knew nothing better, according to Guy, than the use of setons for the surgical treatment of it—quite a fall from Celsus.* Goitre

* It was not until 1443 that Thomas of Sarrano, afterwards Pope Nicholas V, discovered a manuscript of the *De Medicina* of Celsus. Hippocrates was translated from the original about the same time.

during these times, as is well known, was cured by the laying on of royal hands, and the patriotic partisans of the kings of England and France carried on an active and spirited warfare in quite orthodox fashion, as to the claims of priority of their respective monarchs.

THE RENAISSANCE.

The removal of the papal court in 1305 to Avignon, where it remained for seventy years, gave Italy an opportunity to develop her own wonderful terrestrial and maritime resources and to lay a solid foundation for the development of civilization. For without wealth there can be no civilization, and wealth, as Spain gorged with the gold of the New World later demonstrated, does not consist of heaps of the yellow metal drained by conquest or superstition from other countries. In Italy the crusades and the religious devotion which made them possible had swelled the leaking coffers of the church in vain, but when the enterprise of commerce had made her merchants princes, the arts and sciences again blossomed along the shores of the Mediterranean. When we remember the foundations laid in the lives of Darwin, Huxley and Hooker in our own day by the knowledge acquired on voyages in her Majesty's service, we may understand the influence such maritime development exercised on the budding civilization in Italy in the fourteenth and fifteenth centuries. The sails of Venice brought not only wealth but enlightenment to her wharves.

The Influence
of Maritime
Commerce.

The Genoese sailor, the son of a wool comber, had learned indirectly from the Arabs, whom his sovereigns were just driving out of Spain, that the world was round and he was fitting out his three ships to prove it, less than forty years after the fall of Constantinople had extinguished science in the East. The church had denied it. In the process of the suppression of the Pelagian heresy and the establishment of the doctrines of St. Augustine, the book of Genesis had become the reference hand book for the cosmography as well as the cosmogony of the church. Supported thereby, we find the infallible Roman pontiff fixing the age of the world at 6,000 years, while as he walked in the gardens of the Vatican, his sandals were grinding shells which the sea had left there a million years before. At first the hierarchy did noble work in fostering the feeble shoots of learning which began to appear, but later when the vigorous plant began to overshadow them, they strove to destroy it, or rather to train it to grow as they wished, but in vain. It had outgrown their powers. Petrarch (1304-1374)

Petrarch.

ridiculed the ignorance of the physicians, and Bocaccio (1313-1375) exposed and laughed at the vices of the clergy long before any one understood or attempted to invalidate the slavish compliance with authority which so degraded the human mind. Now, 500 years after Petrarch, we are only reminded that this mental slavery once existed by noting some remnants of it in the waste places of modern civilization, and these are the very localities in which modern scientific and political achievement had their beginning in Europe under the Arabians and the early popes.

The school of Salerno began as early as the time of Charlemagne and Haroun al Raschid during the Arabian Renaissance, and became the Civitas Hippocratis to which Richard of the Lion Heart and other great personages resorted in the search for health. By the end of the crusades the Artisan Guilds began to be formed, family names were adopted, commerce and industry sprang up. The commons in the cities wrested their charters of freedom from their sovereigns in the twelfth century. The great Gothic cathedrals arose at Paris, Rheims, Rhouen, Strasburg, Amiens. Saint Louis (1226-1270) founded hospitals in Paris, and his confessor thought he was doing more by establishing the theological school of the Sorbonne which took his name. The school of Bologna, where Mondino taught, was started in 1119, and before the fifteenth century universities were flourishing in nearly all the countries of Europe, and all under the jurisdiction of the church.

Revival of the
Study of
Anatomy.

The Arabians, as we have seen, shrank in holy horror from the contamination of a dead human body, and the students of the School of Salerno, animated as it was by Arab influence as early as the eleventh century, studied the anatomy of the pig. Catholicism also proscribed the study of anatomy by dissection, and at that time the church represented all the public sentiment there was, but the enlightened Frederick II, while successful in his warfare with the pope, commanded (1224 ?) that a human body should be dissected at one of the schools at least once in five years, but after him the emperors kept no abiding power in Italy. The church in those stormy times could not be long kept from temporal power. An edict of Boniface VII, published in 1300, again prohibited dissection not only in Italy but in all the countries under sacerdotal authority. Nevertheless only a little time after this, in 1308, the senate at Venice decreed a body should be dissected annually, and in 1316 Mundinus di Luzzi, called the restorer of anatomy, being the professor in the University of Bologna, had the audacity to dissect two cadavers in public. Besides the im-

Mondino di
Luzzi.

portance of this record in the history of medicine it is also a suggestive indication of rising insubordination against papal authority, much weakened by the dissensions which, as we have noted, had removed the court to Avignon, and had resulted several times in the existence of more popes than one. It was also the servile beginning of freedom from the exclusive authority of the Ancients. Mondino did little more than open the thoracic, abdominal and cerebral cavities and refuse to see anything not described by Galen. He says* the functions of the tonsils are 'to gather the humidity which they generate for the lubrication of the trachea, and to fill up the space so as to make it level between the 'gula' and the epiglottis, and to act as a shield to the apoplectic veins." (The carotids.) He gives the name *coopertorium* (a cover) to the epiglottis, the latter name as usual being applied to the larynx, which is described entirely in the sense of Galen and with the same superficiality and lack of original observation we have already noted in other writers of this period. For nearly two hundred years apparently little advance was made, in spite of the greater prevalence of the practice of dissection. Let us not be astonished at this, but reflect on the few men to-day who see at the autopsy table or under the microscope anything not set down in books.

Achillini indeed made some important discoveries (1463-1512) in other regions of the body, but the editions of his work are so rare and so wretchedly executed, I have had to depend upon the citations of subsequent authors. It was not until the study of anatomy became a passion with the princes of Italy, as it had previously been with the Ptolemies in Egypt, that the great strides noted in Berengar began. Under their protection the arts and sciences flourished, and the study of the anatomy of the human body by dissection wrought great changes in the practice of the Medical Art.

Mondino is called the Restorer of Anatomy, but it is to Berengar del Carpi, who taught surgery at Bologna from 1502-1527 that we owe the actual demonstration of any considerable number of new discoveries. Although he avowed himself to be only the commentator of Mondino, he used the work of the latter principally as a text from which to elaborate his own more extensive and accurate observations.

Berengar del
Carpi.

In Benvenuto Cellini's entertaining autobiography we read his very uncomplimentary reference to Berengar as a charlatan and a mountebank, an impostor and a miser who made enormous sums of money

* *Anatomia—Restituta per Joh. Dryandrum. Marburg 1541,*

out of his new mercurial cure for cases of the French disease, which according to Cellini, at Rome was "molto amici di preti." We receive a hint of his experience with syphilitic cases by the error he was led into through his defective acquaintance with its laryngeal manifestations. He notes* the declaration of Zerbi that certain French singers have their uvulæ cut off that they may acquire a "grossam vocem," but he does not believe it, because he has seen those having no uvula who were hoarse and had the worst kind of a voice. Following Galen he had great respect for the physiological importance of the uvula. Notwithstanding that we have cause to remember, in reading the works of Carpi, the declaration of Aristotle that authority in science is the worst enemy of the advance of knowledge, and notwithstanding the bad stories related by the uncharitable Cellini, Berengar in his Commentaries and especially in his Isagogæ showed that he was an acute observer of anatomical facts. He thought when he noted the nasal muscles he had made a new discovery, but he was not bold enough to be sure of it in the absence, as he thought, of any knowledge of them by others. He declared, at first with some hesitation in the Commentaries (1521) and later more positively in the Isagogæ (1535) that the larynx is made up of five cartilages, the arytenoids or "cymbalar cartilage" being double, but like his predecessors he speaks of the larynx as the epiglottis, and uses the word coopertorium as did Mondino. He says that he had cured patients with perforation of the trachea, but clings to the old belief that cartilage will not heal, "because," he says, "it is spermatic." He speaks of the substance of the "membranoso co-opertorio" (the epiglottis); "around this there is some fat, especially in the place where it is bound to the thyroid cartilage." Most writers referring to this passage agree with Morgagni in believing that Berengar observed the laryngeal glands abundant at this point, but after reading the text it seems to me more probable that he referred to the lymphoid material in the glosso-epiglottic fossa which we now call the lingual tonsil. He was the first to describe the thyro-epiglottic muscle. He was the first to describe the sphenoidal sinus, which he considered the source of catarrh, and he denied that the ethmoid plate was pervious to the passage of the cerebral fluids. He supposed this to take place through the sphenoidal sinus, because he noticed that in one case the nutrient canal of the bone communicated with the sella turcica beneath the pituitary body, which was supposed to secrete the cerebral fluid.

Cartilages of
the Larynx.

Sphenoidal
Sinus.

* "Carpi Commentarii. Anat. Mundini," 1521.

So far as I see this was the first departure from the idea of the ancients, and was an attempt to adjust physiological theories to new anatomical facts, which finally after more than a hundred years ended in the demonstrations of Schneider. He not only noticed the sphenoidal sinus and conjectured that this was the route of catarrhal discharges, but he is said by Cloquet to have been the first to note the existence of the frontal sinuses. Berengar speaks of the lachrymal canal and of the passage of tears through it, explaining that this is the reason we are able to smell odoriferous collyria. Otherwise his anatomy of the internal nose is very superficial indeed.

Some of the prae-Vesalian writers on anatomy strove to explain the countless variations they observed from the Anatomy of Galen by supposing that men in those glorious days were not made in the same mould as at present. They had degenerated and altered in their structure. This has always been a favorite idea with the poets from Ovid down. It is embodied in the very word *descendants*, frequently lingers in the fond recollections of age, and even haunts the title of Darwin's famous book, who indeed has demonstrated the mutability of anatomical structure, but not in a manner to support the assumption of the anatomists of the early Renaissance, who made timid excuses for the originality of their own observations. One may easily see by this servile acquiescence in authority, that it was not only the temporal and spiritual tyranny of kings and priests which enslaved the minds of men. It was the distrust of intellectual infancy, terror stricken at the thought of the loss of support and guidance if they impugned the authority of their predecessors. No fear of papal excommunication and the burning fagots, no dread of being impaled and racked and hung and quartered was at the bottom of this faltering. How ineffectual these instruments of orthodoxy were when used may be comprehended by noting that this intellectual slavery, without the fear of fire here and hereafter, endured quite as long as did that spiritual and political subservience for the perpetuation of which they were employed.

A few years before the death of Berengar (1550) the open revolt to ancient authority in anatomy was to appear. Vesalius was born at Brussels about 1515, just one year before that mighty ruler, Charles V., who had inherited half of Europe from his various ancestors, ascended the throne of Spain and four years before he was crowned Emperor of the Holy Roman Empire. A great man is Charles V. in political history, and not less great in medical history is his physician, Vesalius. He became pro-

The Revolt
from Galen.

Vesalius.

fessor of anatomy at Padua, and taught also at Bologna and Pisa, before the emperor called him to his court. He made many an anatomical blunder himself, but it is to Vesalius that this fundamental branch of our art owes its modern development. He possessed that attribute of genius, which has been expressed by Carlyle as the ability to see with one's eyes, and the inability not to believe what one sees. He declared that Galen had never dissected the human body, but had depended upon examining those of animals. He ridiculed the excuses which had begun to be made for the discrepancies in Galen's anatomy when compared with the results of dissection. He was much readier to believe in the fallibility of the ancients than that the structure of man had varied in a thousand years. It is very evident that as to the anatomy of the nose and throat Vesalius committed more errors than he corrected, but his persistent refusal to accept either Galen or his preceptors' word for that which his eyes taught him was false, his unwearied diligence, and boundless energy wrought great changes in anatomical research. He published his great work which would have been a worthy monument for the labors of a lifetime in 1542, at the age of twenty-seven. He insisted upon the greater value to be derived from personal dissection of the human body, a matter left to barbers and underlings by his predecessors and by many of his contemporaries, than by the continual perusal of the anatomical descriptions of the old Greeks and Arabians, and we find him declaring in bitter scorn of one of his preceptors, who had turned against him, that he would be quite content that as many strokes of the knife should be inflicted on him as he had ever seen his master practice on man or beast. (De Radic. Chyn. Epistola.)

For him, as for his predecessors, and for his successors for more than a hundred years, the secretions of the brain percolated through the base of the skull, but he denied that it found passage through the cribriform plate, following Berengar thus far; but he supposed that it went through the lacerated foramina. Nevertheless he ascribed to the perforations in the cribriform plate the function of transmitting air and odors to the brain,* urging the necessity† of combating the idea of Galen as to the exit of fluids through them. His old teacher, Sylvius, whom he tried to treat with deference and respect, loaded him with opprobrious epithets and scurrilous

* "De Corp. Humani Fabrica," Lib. I, cap. 6 and 12.

† "Ad Joachim Pellant. Epist."

abuse for impugning the authority of Galen in this and other particulars. While Vesalius recognized the mamillary processes as the seat of olfaction he did not ascribe to them the functions of nerves, overlooking the filaments which pass from them and calling the optic nerves the first pair at the base of the skull (l. c. Lib. IV, cap. 3). We have seen that Theophilus had given a better account of them many centuries before, but his observation seems to have been entirely lost to view until revealed by the industry of comparatively recent historians. We may readily understand that the mind of man must necessarily find some explanation for the cribrous condition of the bone here, and it was quite impossible to banish erroneous speculations until a correct understanding was ready to take their place. Zerbi, who lived at the end of the fifteenth century, and met a horrible death at the hands of the vengeful and suspicious Turks now in possession of Constantinople,* described the filaments which the olfactory bulbs give off, but he regarded them as prolongations of the mamillary processes through which the cerebral secretions found their way into the nose. Most of the anatomists of the sixteenth century regarded them as too soft to be really nerves, but Achillini, who died in 1512, described their distribution in the nose.† Massa, who is said to have died in the same year as Vesalius (1564), wrote‡ this in regard to them:

The Olfactory
Nerves.

"Notwithstanding the learned and never to be sufficiently praised Galen, on an examination of the nerves springing from the brain, first at the anterior part where the substance of the brain is, which is called the mamillary caruncles, there are to be observed two soft substances, yet they are not so soft as is imagined, like to the form of other nerves, and they descend, without any doubt, to the nares, and are attached and distributed to the inner substance of the nostrils, for furnishing the sense of olfaction." Nevertheless he hesitates very much to give them the name of nerves, but is inclined to believe they should be so regarded in spite of their soft consistence,

* He had been sent for from Italy to treat a Turkish Bashaw, who improved so much under treatment that the busy practitioner did not think it necessary to remain longer, but sailed away loaded with the gifts of the grateful patient. No sooner had he gone than the patient had a relapse and died. His relatives, believing Zerbi had poisoned him (or did they want his fees?), overtook the ship in which he had sailed away, brought him back to Constantinople, sawed his son in quarters before his eyes and then did likewise with him. This story explains in itself why the Turks had to send away for a doctor, as did the old Persians in earlier times.

† I have derived from Sprengel, Metzger ("Nervorum Primi Paris Historia"), Cloquet and others this account of the work of Zerbi and Achillini, as the originals are, for me, illegible.

‡ "Epist. Med. et Philosoph.," 1542, Epist. VI, p. 58.

and he wonders that the anatomists do not name them as the first pair. Thirty years subsequent to this Varolus,* in 1572, described them as nerves, and in 1627 Spigelius added them definitely to the other cranial nerves. "Septem his paribus quae vulgo sic recensentur octavum addimus, quod nervos olfactorios constituit,† but even he did not follow the filaments through the cribriform plate. Indeed, even Schneider made the egregious blunder of not accepting them as nerves. Bauhinus,‡ in his commentaries on previous anatomical works, in 1621, still followed Plato in the idea that odor is a vapor of the nature of fire, which ascends through the cribriform plate. Fallopius accepted the old doctrine of Hippocrates that vapors ascended through the sutures of the skull. These vapors Galen, as interpreted by Jacob Sylvius, believed to be separated from the coarser impurities in the lungs which were voided as phlegm, the vaporous portions ascending to the head. Thomas Bartholinus,§ as late as the time of Schneider, although he places the olfactories in the category of nerves, does not recognize the filaments as penetrating the nasal cavity. He speaks of the sphenoidal antrum and of the hole in the sella turcica as evidence of the entrance of air and the discharge of the pituitary secretions from the ventricles through them, but he also allowed that secretions passed through the cribriform plate, and had the Hippocratic idea of vapors.

We must now return to the epoch of Vesalius. He led the revolt against Galen, but he had many followers in it. In a matter which much later was the source of a very important controversy he agreed with Galen. He plainly figures an intermaxillary bone.¶ In this he was followed by Fallopius and Columbus. In his comments upon the descriptions of the pharynx we find that he was as much bewildered as we have been, for he says: "Ingenti nominum pelago fluctuamus." We are, however, still somewhat at sea when we read his chapter "De Faucium Glandulis," though we find some advance over the Galenic anatomy. I will translate literally: "There are three kinds of these glandules, one of which, near the root of the larynx, is situated at the sides of the aspera arteria (thyroid?) we have mentioned in the previous chapter. The second is placed higher than the larynx,

*Cloquet ("Oosphresiology," 1821) gives a most exhaustive history of these nerves, as indeed does Metzger (l. c.)

† "De Corp. Humani Fabrica," Lib. VII, cap. 2.; Ed. 1645, p. 193.

‡ "Theatrum Anatomicum," 1621.

§ "Anatomia," Lib. IV, cap. 8; Edit. 1666.

¶ "De Humani Corporis Fabrica," Lib. I, cap. 9, p. 248; Edit. Basel, 1555.

The Inter-
maxillary
Bone.

"Glands" of
the Throat.

since it is seen when we open our mouths in the space which exists between the foramina of the nostrils and the larynx, one glandule being placed at each side, in form and characteristics very similar to a gland indeed. It corresponds very much in structure to other glands, but is much looser, and in this respect distinguished that it forms the saliva and moistens the aspera arteria and the esophagus together with the whole extent of the mouth." It seems probable, from what follows, that he had observed the parotid gland, but had supposed it to be co-terminous and identical with the faucial tonsil. His third kind of glands was apparently the cervical lymph nodes.

His reference to the cartilages of the larynx is rather amusing as indicative of his weariness of the clamor of those who believed anatomy better studied in the work of Galen than in that of the Almighty. We have seen that Berengar had already pointed out that there are two arytenoid cartilages. Vesalius repeats the assertion of Galen that the larynx is made up of three cartilages but he asserts that when you take off the membrane of this region you will find there are two arytenoid cartilages, but for the sake of pleasing those who follow the old anatomists in enumerating the cartilages of the larynx as three in number* without describing them, he will consider this as a double cartilage. He defines the glottis as the space between the processus vocales and confines the word epiglottis to its present signification, correcting and criticising the errors and confusion of the prae-Renaissance and mediaeval doctors in this respect, though he shared the error of Galen as did all those who followed him until the nineteenth century in supposing it is the epiglottis which prevents fluids from entering the larynx in large amounts.† It seems singular that Vesalius who dissected the human body should have ascribed to it the muscles elevating the epiglottis in animals‡ while Galen, whom he charges with having only dissected animals, fails to mention these muscles in man, in whom they do not exist. He thus added two muscles to Galen's category of twelve, describing them as almost round, having their origin on the internal surface of the hyoid bone and being inserted at the

* It will be noted that Berengar speaks of the cartilages of the larynx as five in number. He included the epiglottis as we do and made the arytenoids two. Other anatomists, Vesalius among them, speak of the larynx as being made up of three or four cartilages, according as they regarded the arytenoids as single or double. Aristotle had said the epiglottis belongs to the tongue.

† (l. c. Lib. I cap. xxxviii.)

‡ (Lib. II cap. xxi.)

foot of the operculum or epiglottis. In regard to the uvula and soft palate he does not differ materially from Galen. He repeated the latter's vivisection experiments on the recurrent laryngeal nerve.

Neither he nor Berengar, nor indeed hardly any early anatomist of great note, escaped the charge of human vivisection. With Vesalius, perhaps, this hackneyed accusation gave rise to the story that in expiation of this sin he made the journey to the Holy Sepulchre, dying from shipwreck and disease on the return voyage in 1564. The latter fact seems well established, but whether he had been making an expiatory pilgrimage or not, at least for this purpose, seems very doubtful.*

As has been said, the times furnished a host of anatomists. None, however, surpassed Vesalius, despite his errors, and no anatomical work has ever been published before or since, equalling or even approaching the artistic merits of his magnificent plates, which to be appreciated must be seen in their original reproductions. Indeed, as Roth says: "In the illustrations lies the fiery stimulation and power of his anatomy." Of course as to accuracy there may be much to criticise at present, but even in this they were far in advance of anything hitherto seen. So striking are they, that they were at one time ascribed to the pencil of the immortal Titian, and undoubtedly they resemble the impress of his genius left upon his more authentic productions. The identity of the artist has never been established, a fact in itself suggestive of the unrivalled artistic development of the epoch when Titian (1477-1576) in his long life, or Michael Angelo, who died in the same year as Vesalius, might have traced their outlines. In Grimm's life of Michael Angelo we find it said that Colombo, who was older than Vesalius (1490-1559), made his friend, the great artist, whose passion was anatomy, a present of the body of a young negro for dissection. It was Colombo, who according to Sprengel was the first to give a good description of the ventricles of the larynx. He also experimented on the action of the recurrent nerves. He is said to have antedated Servetus† in the discovery of the pulmonary circulation. Vesalius had made the mistake in the *Epitome of the Fabrica* of describing an internal constrictor muscle of the aperture of the nares, and in this error he

Anatomical
Plates of
Vesalius.

The Pulmon-
ary Circula-
tion.

* Roth: *Andreas Vesalius Bruxelliensis*. 1892.

† "The first description of the pulmonary circulation was published by Servetus in his 'Restitution of Christianity,' 1553, and the same theory was contained in the MSS. copy sent to Calvin at the end of 1545 or beginning of 1546. The reformer refused to return the manuscript and lay in wait for seven years to slay its author' (Whittington). He burned him, but it is only fair to Calvin to say that he made no use of his great discovery.

was followed many years later by Thomas Bartholinus. Colombo denied this statement and showed that such a muscle did not exist. He in his turn made a mistake in describing the cartilages of the larynx as being of the nature of bone, having apparently noted the ossification frequently found in old people. This was corrected by Laurentius (or Dulaurens)* and Casserius.† Colombo speaks of the superior maxillary bone as the *os ampullosun* on account of the sinus.‡

Valverda, a Spanish pupil of Colombo, corrected Vesalius' mistake as to the muscles of the epiglottis, although his work is largely a transcription of the great Fabrica. Another Spaniard, high in favor with Phillip II, who obtained for him an important appointment in Sicily (1563), was Ingrassias, who was the first to describe the anterior ethmoidal cells and likened the structure of the bone to pumice-stone. (Cloquet.) Colombo and Ingrassias both described the inferior turbinated bones, but Casserius a little later (1610)§ described them all, and gave them their present name. There are, he says, hidden in the depths of the nostrils "oblong little bones which may be called spongy, and seem like the steps of a ladder, because one is placed above the other. 'Cuculla,' some call them, I know not through what comparison, unless perchance they wish to liken the two superior to a hood which, however, I would rather compare to the *Concha Veneris*. Hippocrates not inaptly calls them sleeves. Turbines I would call them from their form and function. They are bones, not cartilages. Turbinated bones (*Turbinata Ossa*) they are rightly called. They are usually three in number, indeed this many at least always."

The Turbin-
ated Bones.

In the "De Usu Partium"|| Galen asserts that the bone in this region would better be called spongy than like a sieve (ethmoid), the term applied to the whole bony structure of the internal nose by Hippocrates¶ but as for the turbinated bones as distinct parts, neither Hippocrates or Galen, so far as I see, betray any knowledge of them. The illustrations Casserius gives of them are very poor. He alludes to the cavities of the turbinated bones, evidently meaning thereby the ethmoid cells. The use of the turbinated bones, he says,

* "Historia Anatomica," 1578 (Trans. by Size p. 1179).

† "De Vocis Auditusque Organis," 1600.

‡ "In Re Anatomica." I have derived my extracts from this author, as well as those which follow from Ingrassias and Valverda, second hand from many sources, the originals not being at my disposal. Colombo was the friend, pupil and successor of Vesalius in the chair of Anatomy at Padua, though apparently much older than the latter.

§ "Pentæsthesion."

|| (Lib. VIII, cap. 7).

¶ (De Locis in Homine) (De Carnis).

is to break the force of the entering air and warm it and cleanse it. which as to the nose, we have found in Galen. Bauhinus (l. c.) refers to these authors and says that the turbinated bones fill the cavity of the nose, and are liable to be eroded in syphilis, and he described the anatomy of this region in animals.

A treatise by Fabricius* in 1600 contains very good chapters on the structure and functions of the larynx, but in this he was later surpassed by his pupil Casserius.

The work of Casserius on the Organs of the Voice and Hearing is a most exhaustive and admirable disquisition on the anatomy and physiology of the larynx and ear, comparative anatomy of the parts being there very fully described and pictured in finely executed plates. He gives an elaborate description of the laryngeal muscles.†

Fallopius was a man of fine character and great originality of research, to whom medicine owes much. He was the first to separate the glosso-pharyngeal and describe it as an independent nerve, it having been previously, together with the spinal accessory, which Willis subsequently described, considered as a part of the vagus.‡ He speaks also of the nasal recurrent branch of the fifth pair of nerves. He devotes more attention to the description of the ethmoid bone than does Vesalius. Besides his numerous and valuable observations on the internal ear he describes the lachrymal bones and the lachrymal duct. Fallopius correcting Vesalius declared he was able to find the hyo-epiglottic muscle only in the ox. He gives a tolerably accurate description of the pharyngeal and palatal muscles. While Galen speaks of but one pair of muscles for the palate and fauces, Fallopius differentiates them into three pairs and Bauhinus into four. Vesalius and Colombo had followed Galen in believing the removal of the uvula has an injurious effect on the voice, but Bauhinus§ reports a case in which it was entirely removed without causing any inconvenience.

It is to Bauhinus (l. c.) much in the modern nomenclature of anatomy is due, especially as to the muscles. Galen had named the digastric, but in Bauhinus we note the sterno-hyoid, the genio-hyoid, the crico-arytenoideus posticus, etc., etc. He also was very

* "De Visione, Voce, Auditu, Tractatus." Fabricius ab Acquapendente.

† Vesalius, Fallopius, Colombo, Casserius and the other early anatomists had very faulty ideas as to the actions of the intra-laryngeal muscles. Owing to the complexity of their mechanism this is not to be wondered at. Indeed even yet there is much room for difference of opinion and discussion. I would refer the reader to Holmes' History of Laryngology and especially to his treatise on the Voice for a more extensive and accurate description of this difficult matter than I am able to give here.

‡ Observationes Anatomicæ. 1561.

§ Theatrum Anatomicum 1621 III, LXXXIII.

copious in his references to the works of others. He was accused of a lack of originality, but the care he took to quote his authorities, a thing seldom done before him except in the way of criticism, was perhaps partially the cause of this singling him out from others less conscientious. He adds a comment to the statement of Galen, in regard to some of the liquids in the act of swallowing passing into the larynx, which is an indirect criticism of some conceptions which still linger with us. "For certainly unless something flows along the walls of the air tube in affections of the chest, ecclegmata, syrups and tablets are prescribed in vain." Bauhinus' idea of the tonsils was the same as that of the previous writers from whom we have quoted. Even Casserius in describing the pyriform sinuses,* which he calls cavernulæ, ascribes to them the function of holding for awhile a certain portion of the liquid on swallowing which by gradually gliding down the walls of the larynx keeps them moist and lubricates them. One must keep in mind the necessity of accounting for the normal moist condition of the mucosa in the absence of any knowledge of the functions of the racemose glands. Laurentius (l. c.) indeed speaks of having occasionally noted glands in the mucosa of the larynx, but their nature was evidently unknown to him and his contemporaries. I have thus far met with no mention of similar structures in the nose.

THE REFORMATION AND THE DIFFUSION OF MEDICAL SCIENCE.

We have seen the Roman Pontiffs in conflict with the temporal sovereigns of Europe. We have noted the Renaissance of learning and the great anatomical discoveries which it produced. The princes of Italy, and at first the popes, fostered the advance of original investigations in science, but Buckle perhaps includes them in his remark concerning courtiers. "They are a lazy and feeble race, who, from the frivolity of their habits, are, under ordinary circumstances, predisposed to superstition and prepared to believe whatever the wisdom of their fathers has transmitted to them." Their transient enthusiasm for anatomy would have led to little had it not become a serious pursuit at the universities. The Italian dukes were soon involved in the contests between the popes and the emperors, and in the rude conflicts of the times many of the petty courts perished, as did that of Ferrara (1598), the dukedom of the Este's, the shelter and for years the prison of Tasso. Under

* For an extended history of the valliculæ and sinus pyriformes see A. Rosenberg "Arch. f. Laryng.," Bd. 10, hft. 3, p. 419.

the roofs of these little palaces, the scenes of intrigue, murder and tyranny, even in the shadow of the walls of the Vatican itself, there frequently existed a contempt for the tenets of the church, and so long as the innovations were confined entirely to the intellectual activities of the favored few, there was no interference with the immense strides made by them in the arts and sciences. Soon, however, it became evident that this progress was interfering not only with the temporal power of the church, but was undermining that spiritual authority among the masses upon which the former rested. The papal bull of Clement VII (1542) named six cardinals for the more thorough exercise of the Inquisition in Italy. Among them was Cardinal Caraffa, its most zealous advocate. He became Pope Paul IV in 1555. Having failed in driving away the Spaniards, he began that policy in the States of the Church which quickly drove the sciences, and eventually the arts, out of Italy. "He frequently allowed days to pass by which had been appointed for the Segnatura or the Consistorium, but never the Thursday on which the Congregation of the Inquisition was assembled before him. * * * He gave it the gruesome privilege to employ torture also for the detection of accomplices. He lived and strove for his reforms, made laws, imprisoned, excommunicated and held auto-da-fe's."* He originated the Index Expurgatorius in 1559. A hundred years after the discovery of a new world to which the persecuted might flee, one of his successors inaugurated his pontificate by the pursuit and arrest of Bruno, "not only as a heretic, but as a heresiarch who has written some things which concern Religion and which are not seemly." Seven years later (1600) they burned him as Calvin fifty years earlier had burned Servetus, both ecclesiastical adversaries being anxious to thus supply "that protection against error which the spiritual classes are always eager to afford." (Buckle.) The Protestant believed in his own infallibility quite as firmly as his opponent believed in the infallibility of the Pope. When they could not catch a heretic they went out and burned a witch.† About this time (1580) Montaigne made the sententious remark: "C'est mettre ses conjectures a bien haut prix, que d'en faire cuire un homme tout vif."

Galileo did not think it worth while to be cooked for facts which

* Ranke's "Geschichte der Päpste," Buch III.

† The executions of witches during six preceding centuries were probably not as numerous as took place during a single decade of the fifteenth or sixteenth centuries. After this the practice rapidly declined, being longest popular in Calvinistic Scotland, though the last witch was burned in Switzerland in 1782. Lecky: "History of the Rise and Influence of the Spirit of Rationalism in Europe," Vol. I.

could take care of themselves and could not in any event be long suppressed, but on his bended knees they made him (1633) renunciate the truth as he knew it. One soon grows weary of reading of such senseless brutality, and there is little consolation to be derived from the thought that many were burned who were quite as ready to kindle fagots for others. It was not only the Church desperately struggling to retain its influence over the minds of men which did much to drive original investigation in Science out of Italy, but it was the ruinous policy of the Papal court trying to fill its leaking treasury which mightily contributed to the same end. "It is well known that the art of printing flourished at Venice at the beginning of the sixteenth century, but through the regulations of the Curia it gradually dwindled into insignificance. They never ceased in Rome to forbid the publication of books." (Ranke l. c.) Besides the more or less respectable motive of stamping out heresy, a more worldly and contemptible tendency was exhibited, which was not edifying to the Venetians. Books forbidden by the Inquisition to be published at Venice were issued from the presses at Rome owned in part by cardinals active in issuing the Inquisitorial restrictions. They laid their blundering hands on the delicate fabric of Italian commerce. Restriction of trade and an iniquitous meddling tariff drove the sails of Venice and Genoa from the Adriatic and the Mediterranean, as it has kept our own from the Atlantic and the Pacific. What the interminable and devastating Italian wars at the beginning of the sixteenth century failed to do, the blind interference of the Church with the channels of thought and the channels of trade finally accomplished. The very wars of Italy, with which indeed the whole of Europe was convulsed as an indirect result of the birth of new ideas, were themselves instrumental in carrying civilization and enlightenment to the benighted shores of Britain and the opulent cities of Flanders. The great Paré learned his anatomy at Paris from Sylvius, the preceptor and later the enemy of Vesalius. Although for several centuries the University of Paris had flourished and anatomy had been taught there, it was in the army of Francis I that Paré obtained that experience which led to the great services he rendered surgery. Vesalius, born at Brussels, taught anatomy in Italy, but following the wide travels and the extensive expeditions of the great Emperor Charles, he came into contact with all the civilized centers of population on the continent. Thus and through the channels of commerce was the knowledge and the new thoughts of the Italian Renaissance spread broadcast over the face of Europe. Thus was a welcome prepared at Paris, Oxford and Leyden for the

Decline of
Commerce
and of the
Arts and
Sciences in
Italy.

The Diffusion
of Knowl-
edge.

arts and sciences soon to be driven from Italy by dominant theology just as they had been more effectually driven from Alexandria and Constantinople. Learning, of course, was never entirely banished from Rome. "Out of all the academies which arose from year to year one or two were devoted to science, as, for instance, to botany, although without any results as to original research, but all the others, with singular names, devoted themselves to poetry and oratory." (Ranke l. c.) After 1600 the arts also became mere dilettantism. The soul, the spirit had flown and the ambition of the ecclesiastics and the nobles, directed by bad taste, led even to the lamentable devastation of the few remnants which had remained from the glories of Ancient Rome. One must not forget the services rendered the medical art by Baglivi and Sanctorius and the Italian School, but, in spite of these, the leadership in Medicine passed away from Italy at the close of the sixteenth century.

Leiden erected, in 1574, within its walls a university as a trophy of victory over King Philip and his mighty generals in the Netherlands. Amidst the barren hills of Germany, Luther absorbed from the instincts of his race that stubborn freedom of thought and independence of action which stemmed the tide of subservience to some of the doctrines and practices of the Church. Paracelsus, a drunken mountebank, but a great iconoclast and doubtless a great thinker, performed a like service for Medicine.

By the middle of the seventeenth century the temporal power of the Pope outside of the contracted states of the Church sank into insignificance. The various sects of theologians who had fallen away from the parent stem were, in the nature of their differences, so disunited and so hostile to the Roman Church, that they were impotent to stem the tide of knowledge which was rising. The Royal Society of London (1660), the Academy of Paris (1665) and similar institutions in Germany (1677) were founded and became the centers of scientific thought and learning.

In the part of medical history which now follows it will be noted that the chief names are those of trans-alpine origin. Harvey and Willis were the great minds which dominated medical thought in England in the seventeenth century, not forgetting the immense influence wielded by Sydenham. Malpighi, born at Bologna and working at Pisa, upheld worthily the ancient glory of Italian medicine. Leeuwenhoek, Sylvius de la Boe, Van Ruysch, Boerhaave contributed the share of the newly emancipated Netherlands to the general fund of scientific knowledge gathered in this epoch. It is, however, to Conrad Victor Schneider, the learned Wittemberg

professor, to whom especially rhinology, but other branches of our profession also, are indebted for rescuing the pathology of catarrh from the slough of Galen.

We must now trace in short outlines the epoch-making discoveries in medicine which followed the acquisition of anatomical knowledge in the Renaissance, especially those which directly affect our subject.

Berengar in his time had begun the differentiation of the veins. A half century later, 1553, we have noted that the unfortunate Servetus had declared the existence of the pulmonary circulation of the blood. Before Harvey the idea was that the blood surged back and forth through the vessels, according to the irritation of the parts.* It was believed that inspiration drives the blood to the vessels and expiration brings it back to the heart. At first even the discovery of the valves of the veins did not put observers on the right track, for Cannani is said to have discovered as early as 1547 the valves in the renal and iliac veins, and, even more important, that in the azygos vein. Fabricius ab Acquapendente, who was fortunate in having had Fallopius for his teacher and Harvey for his pupil, together with Sarpi in 1574 discovered these valves in nearly all the veins of the body. Harvey carried this knowledge home with him to England, and in 1616, the year of Shakespeare's death, he began to announce his great discovery in his lectures, which, however, was not published to the world until 1628.† In this great revelation he had not only been preceded, as we have seen, by Colombo and Servetus as to the pulmonary circulation, but there is no doubt that Cesalpinus, who died in 1603, the great botanist and the physician of Pope Clement, who burned Bruno, had some inkling of the systemic circulation.‡ When we come to study the history of tracheotomy we shall find Brasavola, who died in 1555, declaring, as quoted by Holmes, that "in Angina, when there is no other possibility of *admitting air to the heart*, we must incise the larynx below the abscess." With the other errors of the ancients this had existed in medicine since the beginning of its records. If we should translate the word *pneuma* as oxygen, the conception of the Greeks would, perhaps, not seem so strange to us in very many of their passages. However inaccurate and impossible this rendering would often be, it would help us to keep in mind the kernel of truth buried deep in the erroneous ideas of Hippocrates.

The Begin-
nings of
Physiology.

The Circula-
tion of the
Blood.

* For an exhaustive review of the ideas of the circulation before Harvey, see Daremberg, "Hist. Generale des Sc. Med.," Vol. 2, p. 582, ff.

† "Exercitatio Anatomica de Motu Cordis et Sanguinis."

‡ See the quotation in the "Dictionnaire Historique de la Medicine." Ed. 1828, sub voce.

Before Harvey had published his great work, Faber* in 1624 had ascertained by investigation that not the smallest amount of air passed into the heart from the lungs. Harvey also pointed out that the air in the trachea does not pass beyond its ultimate subdivisions. Thus was this fundamental fact in medicine, so important especially to modern laryngology, established, after the usual period of resistance and discussion.

Now let us immediately turn to the further elaboration of the history of that other fact so important to the development of our knowledge of the diseases of the upper-air tract, viz: the existence of the mucus glands and their functions. We have followed the error of the origin of catarrhs down to the time of Schneider. Just as we have perceived the necessity for some explanation of the moisture of the surface of the mucosæ, so we may understand the influence of the growing improbability that fluid percolated through the bony foramina at the base of the skull. Berengar we have seen imagining a way for the catarrh through the nutrient canal of the Sella Turcica and the sphenoidal sinus. Vesalius, in spite of Sylvius, also refused to accept the cribiform plate as a true sieve, and found a way for the drain of the supposed secretions of the brain through the lacerated foramina. I have quoted Zerbi's idea that the processes given off from the olfactory bulbs were wicks for the drip of the cerebral fluids into the nose. Any one familiar with the old process of making dip candles will understand the idea. Perhaps this was the germ, transmitted of course from Galen, of the idea of Willis†, whose works were contemporaneous with those of Schneider.

Willis and his school believed firmly in the existence of an actual nervous fluid, just as we find it convenient to assume the existence of a nervous electric fluid. The nervous fluid of Willis was the secretion of the brain. Some of this was received through the infundibulum by the pituitary gland, which he seemed to regard as a sort of reservoir for the superfluous fluid which was carried away by the blood vessels. He believed the nerves were porous and carried this vital animal fluid from the brain to different parts of the body, supplying them with nutriment and animal force. He says‡ "Within the cavities of the nose there are tubular membranes which contain thickly woven sensile fibres. In these membranes there are a number of slender nerves given off from the mammillary processes through the cribiform plate." He insists that, although the base of the skull§

* "Sprengel," IV, 174.

† *De Cerebri Anatome, cui accessit Nervorum Descriptio et Usus.* 1664.

‡ *De Anima Brutorum. De Sensu Olfactus, Cap. 13.*

§ "De Cerebri Anatome," Cap. 12.

seems closed by membranes in the dead animal, the serum is so limpid and the nerves so porous that "nothing is more certain than that the serous humors are distilled from the nerves like serum from the membranes in swollen joints." This idea is again expressed in the "Nervorum Descriptio et Usus" where he derives the mammillary processes from the cerebral ventricles that they may there receive the serosities and transmit them through the olfactory bulbs to the nasal mucosa, which, from the supposition that it contained tubules, was thought capable of transmitting vapors and odors from below to the brain. It is probable that this erroneous idea and that of Van Ruysch, who believed that the blood vessels had tiny openings through which serum is distilled but not blood, arose from the observation of the little beads of clear secretion which may be observed by the naked eye to exude from the mouths of what we now know are the racemose glands. We must follow these erroneous ideas far beyond the time of Schneider and then retrace our footsteps in order to follow the right path upon which the latter entered. Van Ruysch, whose "Thesaurus Anatomica" was published nearly fifty years after the works of Schneider, thus* speaks of the mucosa: "Nasal glands may be plainly seen here, since they are suffused with redness, on account of the fullness of the arterioles, and these are nothing except bundles of the extremities of the arterioles†, moistening the nose, which so-called glands, in the live man as well as in the dead man, escape detection, but in the specimen are plainly demonstrated by our method." (*i. e.*, the injection of wax into the arteries.) Diemerbroeck‡ preferred Willis' explanation to Schneider's, but modified it somewhat, believing the holes in the cribiform plate were filled by "nervous tubular membranes derived from the dura-mater, which open into the fungoid flesh of the nostrils, which is attached to the spongy bones, and through these tubules mucus is transmitted from the ventricles of the brain to the fungous flesh in which they terminate. This is the reason that something may come from the brain into the nose, but nothing can go from the nose into the brain, since when anything ascends it is stopped by the arrangement of the ends of the tubules in the flesh." He declares that these tubules may be seen with the magnifying glass if the upper bone of the roof of the nose is removed. The tubules may then be seen hanging to it. He denied the assertion that these structures are nerves, and refused

The Vascular
Theory of
the Nasal
Glands

* "Thes. Anatom.," VI, 3, Not. 2.

† The idea of the glands in the mucosæ being a bunch of blood vessels was a favorite doctrine with Bellini (1665) and the Italian School.

‡ "Anatome Corporis Humani," Ed. 1672, Liber IX. Cap. 7 and Lib. III, Cap. 8.

them a place as the first pair. A cold for some reason causes not only an increase in the cerebral secretions, but the contraction of the cerebral membranes drives it into the nerves. We find Caspar Bartholinus, the son of Thomas, in 1679* after referring to Schneider, still agreeing with the doctrines of Willis. Although Dionist† refused entire credence to the idea of Willis as to the porosity of the nerves, and entirely rejected the permeability of the ethmoidal foramina, he still ascribed to the sutures of the skull the function of permitting the transpiration of the vapors which arise from the brain and its membranes. He also believed that they permitted absorption of external medication through them to the organs within the skull. Bryan Robinson, and especially Nicholas, in his treatise on Hypochondria (1719), finally entirely refuted the opinions of those who believed with Willis that the nerves were hollow channels, and called in doubt the existence of the fluid which was supposed to be carried through them.‡

To understand the persistent hold this idea, in the face of Schneider's work, had on the medical mind, we must remember that Hippocrates looked upon the brain as a gland, and the whole fabric of his system was permeated with this belief. It persisted even with Malpighi, who did so much with the microscope, demonstrating not only the red globules of the blood (1661), the air vesicles of the lungs and many other phenomena, but the hollow nature of the acini of the conglomerate glands. Malpighi's friend, Carolus Fracassatus, writes to him thus concerning the brain:§ "I think it is a pneumatic instrument which is an aid to movement and sense through the nerves—air ascends through the nerves to the brain." In Malpighi's response to this letter it is evident that he knew nothing to the contrary. On microscopic examination of the cerebral ganglia he declared their structure to be glandular in character. Glisson, who also did so much to advance the knowledge of the viscera, and many others, had the same idea. Wharton refused to accept this view, though he believed the nerves acted as channels for the transmission of fluids.

Notwithstanding the prevalence of all this error even among the very men who were gradually working out the truth, long before Schneider, we may recognize the advent of the conceptions which he founded as fact by actual observation. I am indebted to Sprengel (III, p. 280) for this quotation from a work first published in

* "Thomæ Bartholini Acta Medica Hafn.," Vol. V, p. 61.

† "Cours d'Anatomie," 1701.

‡ Sprengel V. 172.

§ Malpighi: *Epistola Anatomica de Cerebro*, 1665.

1546:* “Moreover Cardanus suggests that the mucus which runs from the nose and mouth does not really come from the head, but very often it is produced by the secretory organs of the nose and throat.” Van Helmont† who died in 1644, twenty years before the publication of Schneider’s book on Catarrh, had a less accurate notion of the origin of pharyngeal secretions than Cardanus, but he at least did not ascribe them to the brain. Following Paracelsus in his mysticism somewhat, but greatly surpassing him in honesty and actual knowledge, he did much to introduce chemical principles into medicine. He seems to have been the first to assert that diseases are local in their actions and not dependent on a disturbance of the whole body or any vital principle.

Van Helmont says: “The mucosities which are expelled by the expectoration and in coryza, do not come from the head nor are they secreted by the arteries, but they arise from the superfluity of aliments which remain adherent at the upper part of the pharynx.”

Wepfer, whose work was published in 1658‡, has the following reference to the origin of catarrhs and the destination of the vapors. He says that the latter were supposed to extend from the stomach to the head, “just as though the head was to be compared to the smoky roof of a house or the lid of an alembic,” but he denied the possibility of this except by means of the carotid vessels. “At the base of the brain are the thick meninges, at that point most impenetrable and almost four times the usual thickness. The cranium in the live animal, or in the animal just dead and not yet deprived of all the membranes, should not be thought to be similar to the representations of it in books on the bones. Especially all those holes which are seen at the base are occluded so that no ingress or egress is allowed to the vapors or the humors, as may easily be determined.” How much of this may have been derived from Schneider’s work on the ethmoid bone published shortly before, does not appear. We see, therefore, as we have noted in the discovery of the circulation of the blood by Harvey that the idea of the local origin of catarrhal discharges had long existed in the world before Schneider, and we have seen that the error of their cerebral origin persisted many years after his death (1680).

A view of the voluminous writings of Conrad Victor, Schneider may well appal the stoutest heart. Never was the kernel of an im-

The “De Catarrhis” of Schneider.

* Cardanus. *Contradic. Med. Lib. II, tr. I. Cap. 4, p. 443.*

† *Opera Omnia. Catarrh. Delirament, p. 412. Ed. 1682.*

‡ *Observationes Anatomice ex Cadaveribus eorum quos sustulit Apoplexia.*

portant fact so wrapped up in the husks of verbosity.* The dissertation on the cribriform bone is a treatise which opens the way, as must have done the investigations on which it is founded for the author's thoughts, to the larger work on Catarrh, for in his opening remarks he insists upon the impermeability of the base of the skull to liquids or air. The grateful reader may well excuse any omissions in the following exceedingly compressed account of Schneider's dissertations on Catarrh. He showed that the origin of the catarrhal discharges can not be in the cranial cavity, and they could not get out if such secretions were formed there since neither the cribriform plate nor the nutrient canal of the sphenoid bone nor the lacerated foramina, as claimed by various writers, are pervious. As a matter of fact, no fluid so viscid as mucus is to be found there at all. Neither could it be born through the nerves. (Libri I and II).

He described a new origin for nasal discharge in the anterior and posterior pituitary membranes, as he calls them. Mucus may be squeezed out of the membranes of these regions even in the dead subject. He does not once mention the glands as the source in the mucosa of this mucus. He speaks in the same way of the tonsils and of the ocular and lachrymal mucosa. The anterior and posterior pituitary membrane when normal exudes this mucus moderately. When more is exuded catarrh arises. He insisted that in coryza the brain is not affected at all. Even in a horse dying of glanders, the brain was found unaffected. There can be no doubt from his description of what he calls the posterior pituitary membrane that he had noted the existence of lymphoid hypertrophy, but he does not clearly recognize it as pathological. (Libri III and IV). His etiology of catarrh is hardly worth transcribing and the same may be said of the treatment, notwithstanding the radical character of the advance he made in the knowledge of the physiology and pathology of the nose. Coryza he defines as a catarrh of the anterior pituitary membrane, while under the head of posterior pituitary catarrh he includes affections of the throat. *Branchus* is a name he gave to too great a secretion from the larynx. Apparently he derived this from Paracelsus. It did not long continue in use after his day.

* The patient reader may be referred to,

Dissertatio de osse cribiforme, 1655.

De Catarrhis, libri VI-1660-1661.

De Catarrhis, liber specialissimus-1664.

Although exceedingly verbose, still his Latin style is perspicuous and by no means wearisome reading.

When the latter is accompanied by difficulty in breathing of all kinds he called it catarrhus suffocativus, and this term persisted for more than a hundred years in medical literature, notwithstanding the differentiation which was constantly going on, and for a time was synonymous both with diphtheria and with bronchial asthma.

While, therefore, it was Schneider who clearly demonstrated that the mucosa itself is the source of catarrhal discharges, he did not demonstrate those structures in the mucosa in which it is formed and from which it escapes, *i. e.* the racemose glands.* If the reader will refer back to the quotation of Marinus I have taken from Galen (P. 73), it will at once be apparent that while what the ancients called glands had been noted, their function was for the most part unknown, and included many things which are no longer regarded as glands, the distinction between the conglobate and the conglomerate, or the lymph nodes and the racemose glands being of course entirely unsuspected. In the course of this history we have found reference to the brain, the tonsils and the thyroid glands as moistening the adjacent mucosæ. While the nature of the brain and that of the tonsils have long been known it is only of recent years that the thyroid physiology has begun to be elucidated, though Haller a hundred and fifty years ago asserted in his Physiology that it had to do with the elaboration of the blood. Many had speculated as to the function of the thyroid gland. Desnoues, who is said to have originated the method of injecting of blood vessels with wax in his demonstrations, and Coschowitz, both of them seventeenth century observers, declared, according to Haller, they had found the ducts of the thyroid opening into the foramen cæcum of the tongue. This was refuted by Morgagni.

The Evolution
of Knowl-
edge of the
Mucous
Glands.

I quote from the "Adeno-Graphia Curiosa" of Nuck published first in 1692, "Those who first began to examine the structure of glands, both conglobate and conglomerate, were Wirsung, Wharton and Steno, who not only demonstrated the size and shape of the glands, but their inlets and outlets." It may be noted that Nuck, though he does not in his catalogue allude to the nasal glands, speaks of those of the membranes in general as clinging close to their substance. Knowledge of the true condition of affairs as to the origin of catarrh had advanced so far with many observers as to induce Nuck to write a humorous epitaph upon the pineal

* Let us for the sake of simplicity avoid the complicated question as to how much of the nasal secretions come directly from the blood vessels without passing through glandular epithelium.

gland as such. The history of the racemose glands of the mucosæ is so inextricably interwoven with that of the glandular organs of the general system that they can not well be separated.

The Chyliferous System.

Eustachius had already in the sixteenth century described the thoracic duct. Aselli in 1622 announced the discovery of the lacteals in the mesentery, the existence of which, illustrating the fallibility of great minds, was obstinately and persistently denied by Harvey. In 1641-3 Hoffman, Wirsung, Riolan, Wormius discovered and confirmed the existence of the pancreas and its connection with the digestive process. Pecquet a few years later discovered the chyle in the vena cava coming from the thoracic duct by way of the subclavian vein, and again the rule of human fallibility was followed by Aselli, who denied the reality of Pecquet's addition to his own discovery, (Sprengel IV, 209).

The Lymphatics.

Gradually the lymphatic system was proven not to be a part of the chyliferous. Fallopius many years previously having noted the lymphatics of the liver, Rudbeck distinguished them from the lacteals more recently discovered by Aselli. The liver became an excretory instead of a secretory organ after Glisson had elucidated its anatomy. Thomas Wharton,* whose name survives attached to the duct of the submaxillary gland, asserted the brain is of a different nature from the glands and other viscera. In spite of many mistakes he added greatly to our knowledge of the structure and functions of the glands.†

Franciscus de la Boe Sylvius,‡ according to Haller, was the first to separate the conglomerate from the conglobate glands, our racemose and lymphatic glands respectively. His pupils, Steno and De Graaf, greatly extended this differentiation. De la Boe, following the thought of Galen in quoting Marinus, says that there are two primary kinds of glands. "For there are some as if made up of separate parts and from smaller conglomerate glands, stuck together, as it were, with some inequality of the surface, such as the pancreas and thymus. Others are observed to have a smooth surface and as if blown up and moulded together. (*Ex una quasi sibi continuata substantia, conflata et conglobata.*) Such as are contained in the mesentery and in the groin and elsewhere are supplied with

* "Adenographia," 1656.

† Those who desire to find an account of the services rendered to medicine by Wharton, as well as an account of the numerous and glaring errors mingled with his original observations, may refer to Daremberg, "Hist. Gen. des Sc. Med.," II, p. 640 seq. He believed the nerves are vessels by which the glands intercommunicate.

‡ "Collectio Disputationum Medicarum, 1663.

lymphatic vessels. To this may be added, if desirable, a third kind, the renal glands and their accessories.” While there is much said by this author of the pancreatic and salivary glands as distinct from the lymphatic or conglomerate glands, no mention is made of the muciparous glands. To Steno,* perhaps, more clearly than anyone else, belongs the credit of first describing them. He described the larger glands of the mouth and eyes and the *vessels* of the membrane of the nose, which, he declares, are of two kinds, and they exist in the mucous membrane for the purpose of keeping them moist. Steno first noted the duct which bears his name in 1660, but it had been known to others before him. Sprengel (IV, p. 236) quotes Walther for authority in asserting that Rivin was the first to discover the duct of the sublingual gland which Caspar Bartholinus, the son of Thomas, claimed the honor of first noting in 1682, ranula or dilatation of this duct having been known and operated on from the earliest times.† Nuck (l. c.) added a greater exactitude and a wider observation of the glands to the works of the more original writers just mentioned.

The Mucous
Glands.

Havers (1691) supposed the spaces known by his name which he first observed in bone were glands, and Pacchioni’s name is attached to the structures in the dura mater which he believed to be glands (1705).

I have not exhausted by any means the indications of the great activity in the latter part of the seventeenth century in the anatomical investigations of glandular structures, made possible by the improved microscope of Leeuwenhoek, though it was Malpighi, with a less effective lens, in spite of his egregious blunder as to the brain, who first demonstrated, as has been said, the hollow nature of the conglomerate glands (1689). As we have seen, Van Ruysch, many years later, attempted to refute this opinion, claiming the glands were bunches of minute blood vessels, as Bellini had declared.

The Micro-
scope.

The old compound microscope, said to have been first suggested by Zansz in 1590, was a very imperfect instrument, and about a hundred years later was superseded by the vastly more efficient, simple high curvature lens of Leeuwenhoek, with which he studied the capillary circulation, the infusoria and a host of other hitherto unnoted phenomena. It was doubtless with such a magnifying

* “Observationes Anatomicæ, Quibus varia Oris Oculorum et Narium Vasa describuntur,” 1662. I know not how to account for the priority in date of Steno’s book over De la Boe’s, if we are to accept Haller’s remark, except that the teachings of the latter were long unpublished, and, indeed, they seem much less advanced than Steno’s.

† Celsus: Lib. VII, Cap. XII, 5.

glass that Santorini* examined the glands in the nasal mucosa. "If we wish to demonstrate them most clearly we arrange the membrane, previously cleansed and somewhat macerated under the crystal, and the light being conveniently and adequately arranged for it, we may recognize their number, their size and their color. Their size varies indeed, some being a little ovoid, and these are about equal to a grain of mustard."

The Pharyngeal Tonsil.

Schneider† gave a rather poor illustration of the pharyngeal tonsil and thus describes it: "It is of a whitish color, the adjoining membranes being bloody or dusky. It is fuller than they and like fat. It is always moist and exudes a glutinous substance." He located very definitely this posterior pituitary membrane, as he called it, as existing between the vomer and the foramen magnum, being bounded laterally by the pterygoid plates. This being Schneider's description‡ of the pharyngeal tonsil, we find Santorini describing it, as he did the glands, much more clearly than did his predecessors. "This membrane I have sometimes met arranged in shallow grooves (cavities) as if with some kind of order. Sometimes I have found it in irregularly arranged forms and so cavernous that, with its gaping holes and deep sinuses it almost equalled the tonsils. From this a mucous fluid is apt to exude." Haller also described this organ.

Notwithstanding the opposition to Schneider's views and the persistence of the old pathology, they were at once accepted by many distinguished medical writers. Thus we find Etmüller§ saying in 1685: "The origin of all catarrhs is the conglomerate glands."

The Seventeenth Century Theories.

During the seventeenth century we hear a good deal about vital heat, somewhat equivalent, at least in a physical sense, to what we now mean by animal heat. This was connected at first with ideas of the soul, whose habitat the materialist Descartes fixed in the pineal gland, which was beginning to be vacated as the storehouse for nasal secretion. This "Vital Heat" was an outgrowth of the "Pneuma" of the Ancients. Gradually the true idea arose out of this, but much later, that this vital heat depends upon chemical action. Before this time, under the old theoretical pathology not only were diseases hot or cold or wet or dry, but their remedies must perforce partake of the same or of opposite qualities. It is

* "Observationes Anatomicæ," 1724, cap. 5.

† "De Catarrhis," III, fig. 2.

‡ This passage may perhaps be more readily referred to in the excerpt made from Schneider's text in the footnote to the first page of Zuckerkandl's "Normale und Pathologische Anatomie der Nasenhöhle." Bd. I, 1893.

§ Opera Omnia: "De Catarrhis."

very difficult for the modern student of medical history to attempt to fathom the reasons for according these properties either to drugs or diseases. He is apt to regard them as the "ludibrium ingenii humani," but it is a joke spread thick over the broad expanse of more than twenty centuries, and if in the course of this history, very little is said of them, it is not because they do not start from the page of every ancient author after Galen.

While the sixteenth century is marked in medical history by great advances in the knowledge of gross anatomical facts, the seventeenth is no less distinguished by the elucidation of an enormous amount of physiological data. This we have seen was a logical sequence, and as we proceed we will perceive, I trust, that the pathological observations which followed in the eighteenth were a natural outgrowth of physiological activities in a preceding epoch. Medical history has its lessons, no less useful than that of the rise and fall of empires.

Sanctorius (1516-1636) who had witnessed Galileo's invention of the thermometer improved it and adapted it to clinical purposes. The influence of the philosophy of Descartes had resulted in the advent of the Iatro-physical school which had its earliest and greatest exponents in Italy. The alchemists and Paracelsus had finally subsided. Out of their activities was brought about the introduction into medicine of a more or less rational Iatro-chemical school which had perhaps a wider following. We recognize the importance of the observation which noted the change in the color of the blood in the transit of the lungs. This was made by several, among them by Lower who in another publication showed himself the adherent of the new ideas of Schneider, for he published in 1671 a "Dissertation on the origin of Catarrh in which it is shown that it does not come from from the brain." This change in the color of the blood led to what was practically the discovery of Oxygen by Mayow who wrote treatises at Oxford in 1668 and 1674. He identified the gas which causes this change as nitre-air or ærial spirit and as the same agent which supports combustion.

The Iatro-Physical and Iatro-Chemical Schools.

In the seventeenth century medical monographs, the specialization, of medical literature, became more numerous and instead of weighty voluminous tomes containing all the wisdom garnered from all the fields of medicine or even of universal science we meet with the masterly essays of Harvey and of Malpighi. We more often remember the fight between the barber-surgeons and those who disdained to do anything but observe and evolve theories of which the age was prolific. These are only a few hints of the

broadening of knowledge and the consequent necessary narrowing of the fields of individual human endeavor. Many old errors still lingered. Van Helmont who did not die until 1644, and Willis who was not born until 1622 when Harvey had been teaching his doctrines for six years, still conceived of the air as passing from the air channels through pores into the thoracic cavity. (Spengel IV, 186). As far back as the time of Euclid under the Ptolemies light was supposed to issue from the eye to the object. Although this was corrected by the Arabians, mistaken theories still prevailed, but we are now in the time of Newton through the effulgence of whose great intellect Medicine was guided in the study of the physiology of the eye.

The Disappearance from Medical Literature of "Chaldean Therapy."

Far beyond the period of the early Renaissance and well into the seventeenth century may be found the recommendation of stercoraceous drugs for angina. Hollerius, writing in 1623, advises their use and faithfully transcribes one form of the old swallow prescription. In a curious old book, apparently for home use, published in 1692 by the Hon. R. Boyle, Fellow of the Royal Society of London* among many others I find the following prescription: "Take about one dram of Album Graecum or white dog's turd, burnt to perfect whiteness, and with about one ounce of Honey of Roses, or clarified honey, make thereof a linctus to be very slowly let down the throat." Many better known writers still gave them a place in their pharmacopeia. Thus we find the prescription of both the swallow and the dog's excrement in the *Bibliotheca Pharmaceuticæ Medicæ* of Mangetus (Edit., 1703, Tom I, P. 982 and 470. Gradually, however, much of the Chaldean Pharmacopeia was relegated to the old-wives medicine chest, where it still lingers, supported by a credulity which has not all taken refuge in the same mènage. It was about as hard to get rid of this sort of medication as it was to introduce a more efficacious. One may see in the history of the introduction of quinine, about the only drug which we have that really cures a disease and annihilates its cause, how rebellious the human mind is to the plain demonstration of fact in therapeutics, when it contravenes the theoretical doctrines of the day. The Jesuits bark crept into Europe in 1638 and the orthodox practitioner of the day absolutely rejected it and for a time left its employment to be mingled with the hocus-pocus of priests and mountebanks. It is even charged against our profession that one reason for the resistance to its use was the promptness of its action

* Medical Experiments or Collection of Choice and Safe Remedies.

and the simplicity of its preparation by the apothecaries, intermittent fever being then as rich a mine for the doctor and druggist as phthisis still is.

Amulets and charms, it is true, disappeared from medicine soon after the beginning of the Renaissance, but astrology, out of which grew the discoveries of Copernicus and Galileo, long continued prominent in medical thought as it did in its influence upon the actions of men. Pope Paul III, who became pontiff in 1534, learned as he was in Greek and Latin, never presumed to undertake the smallest personal business nor engage in the weightiest affairs of state without first consulting the stars. Two hundred years later we shall find a grave doctor discoursing on the influence of the moon on nasal polypi.

Soon, however, among men of science astrology became astronomy, alchemy became chemistry and therapeutics soon began to look to physiology and pathology for help.

THE RESULTS OF THE RENAISSANCE.

It is unnecessary to enter further than we have already done, into an account of the collateral events in the development of our knowledge of the nose and throat. The facts brought to light were numerous. Scarcely less abundant were the theories to account for them. Through this maze of truth and error we must try to trace the thread of our own story. To take this up we must return to the period succeeding the revival of anatomical learning, in order to see the effect it had on the ideas concerning the nose and throat and their treatment. It is of only incidental interest to remark here that the first separate treatise of laryngeal disease I have met with, is that of Codronicus' "*De Vitiis Vocis*," published in 1597. It contains nothing of value, being a faulty copy of Galen's ideas. It is, however, significant of the tremendous amount of pulpit oratory which was going on then, often perhaps under circumstances very trying to the organ of the voice, to find the author on the first of his 147 pages declaring that he writes the book for the good of the preachers of the Holy Word. This I believe is not now to be found in the prefaces of text-books on the larynx. Very little perusal of it will reveal evidence that the clergyman's sore throat was then well known.

A little before this, in 1591, Forestus, a very voluminous but a perspicuous writer, devoted, in his works, *300 12mo. pages of fine print to the diseases of the nose and throat. In regard to Anosmia he says:

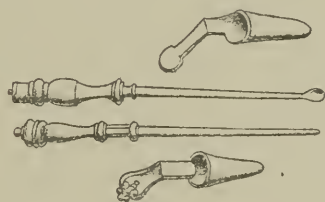
* *Observationum et Curationum Medicinalium Libri.*

“If it is from ethmoidal obstruction, or from the humour discharged from a catarrh, the latter must first be cured. (By ethmoidal obstruction he does not here mean the stoppage of the holes in the cribriform plate). If from flesh growing within the nose, or from a wart or a hemorrhoid, it is to be cured by the surgeons by operative procedures, either with a cutting instrument or cautery or snare.” All of which is good treatment, but then follow therapeutic measures based on prae-Schneiderian anatomy: “If from an abundance of humours filling the ventricles of the brain or obstructing the sieve-like openings, it is to be carried off by the letting of blood, or by purging.” The cautery is often mentioned with recommendations not only for its intra-nasal use, but as a remedy in nasal disease to be applied to the cranial bregmata and the posterior cervical regions, a method of treatment we have noted in Herodotus as existing among the Libyans, for the prevention and cure of coryza and catarrh. Indeed his therapy seems a queer mixture, some of it taken from hoary antiquity, while some of it bears favorable comparison with modern treatment. He claims to have cured a girl of ozæna by copious nasal douching “with perfumed white wine in which were dissolved cypress, roses and myrrh.” He also used nitrate of silver and alum rubbed up with honey and applied with a probe. We are a little shocked to find, further on, that he cured another by bleeding, purging, cupping, diet for six weeks and administering a decoction of guaiac. Forestus dwells on the ravages of nasal syphilis, which prefers attacking the bone to the soft parts, and he reminds us that not every ulcer in the nose is ozæna, for often ulcers arise from a salty mucus which produces crusts, and these are easily cured. We find this crude pathology at a much later date. Boerhaave declared (1668-1738): “This mucus, being also corrupted, produces an ulcer which corrodes the adjacent bones.” Of course ozæna, after the advent of syphilis, was frequently confounded with it.

We may note here the method of treating ozæna detailed by Fabricius ab Acquapendente* who wrote about the same time as Forestus, but whose works are of much more importance in the history of medicine. After criticising the treatment of Celsus, he says: “Wherefore I offer you a similar surgical procedure in ozæna, but a far milder one. An iron canula is to be inserted in the nostril, so long that it will reach the end and equal the length of the ulceration and occupy the cavity of the nostrils; through this a glowing hot instrument is to be introduced, which, however, should

* Opera Chirurgica: “De Chirurgicis Operationibus,” Cap. XXVI; edit. 1723.

not reach beyond the canula; it should be so done that the hot iron heats the tube, and through this the nasal tissues and the ozæna; it is not intended that the nose should suffer pain from this heat, but only that the ulcerated part should be heated to a point short of pain (*citra dolorem*), in one having a good tolerance. This being perceived the canula may be taken out of the nostrils, the secretions cleaned off and then replaced." This was to be repeated as often as necessary until the part was thoroughly cleansed of crusts, the mucous membrane made red without the pain of burning, the secretions stimulated, and thus the ulcer healed. Dionis much later (1707) followed practically the same method, and I am sure every modern rhinologist will appreciate the value of the suggestion. Dionis used a canula closed at one end.



The Nasal Cauteries of Dionis.

Forestus† referring to the tonsils, under the heading of inflammation of the glands, as small caruncles which all men have at the back of the mouth on each side. His method of treating hypertrophies in this situation in a young girl of eighteen was atrocious. She was nearly suffocated with large tonsils, and had never menstruated. He administered the extract of swallow's nest (one could make a homœopathic pun on it in English but not in Latin), and gave her urine to drink. Bleeding and cupping were vigorously used and after five days "in spite of the treatment she fell into a deliquium animi" which he ascribed to "uterine suffocation." He then quotes Aetius as saying on the authority of Archigines: "Many virgins at the age of puberty, lacking their menses, are seized with this affection." This differs from modern ideas, whose interpretation would be "Many virgins, at the age of puberty, lack their menses, because they are seized with this affection." Elsewhere he dilates on the virtues of the stercoraceous drugs in affections of the tonsils. Further on we shall have to refer to the first account of an epidemic of Diphtheria by Forestus, but in his chap-

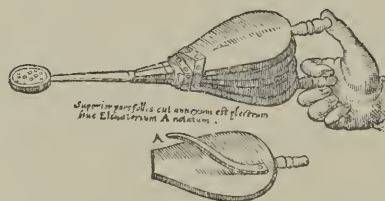
Tonsillar Hy-
pertrophy.

† L. c. Lib. 15, obs. VII.

ters on the nose and throat we find plentiful evidence of sporadic cases, undifferentiated from other throat inflammations, and we read* a graphic description of the death of his own father from laryngeal stenosis, without apparently the thought of a tracheotomy, though he was perfectly familiar with the description of it by Paulus. Cynache, Paracynche, and cynanche with phlegmonous facial erysipelas, are terms which still remind us that the frequency of that type of disease must have then, as in the time of Hippocrates, been greater than now, perhaps from personal uncleanness and the greater exposure thereby to septic influences.

Fabricius ab Acquapendente, after describing the operation of tonsillotomy as performed by Celsus and Paulus Aegineta, says: "Wherefore we may gather—that it is neither entirely easy nor safe to carry out the operation." Consequently he advises "seizing the tonsil with a long, slender forceps to draw it out so that by skillfully making traction the tonsil, as if of its own accord, will follow.† There is another Fabricius, from whom much may be learned regarding the surgery of the throat at this time. Fabricius Hildanus‡ relates the case of a young man with such a hypertrophied and elongated uvula that it nearly filled the mouth and touched the teeth. It was so large, swollen and vascular, they were afraid to operate, and sent the man home to die, as they thought. On a less dangerous looking condition, in another patient, he advised operation. In a third, the growth seemed malignant, and he left it alone. For the insufflation of powders which he used in these and other cases he devised a powder blower. (Fig. P. 95, 96). The tip of the uvula was engaged

The Uvula.



The Powder Blower of Fabricius Hildanus for the Uvula.

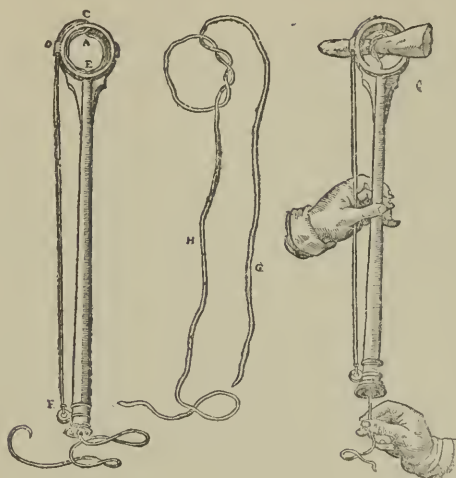
in the cup, and powder was thus thoroughly blown on it. If the relaxation and inflammation of the uvula did not yield to these measures, it was to be cut off with the scissors, or ligated, or burned with

* Lib. XV, Obs. XV—Scholia.

† L. c. Cap. XXXVIII.

‡ Observationum et Curationum Chirurgicarum Centuria II. Opera Omnia, 1646. Obs. XIX.

caustic. For tying the ligature he used an instrument which was long in vogue. (Fig. P. 97, 98). He used another instrument



The Uvulotome of Fabricius Hildanus.

for applying the actual cautery to the organ. It consisted of a long canula, fenestrated at one end. The uvula, engaged in this aperture, was burned with the hot iron thrust through the open end, the other being closed. Following Galen, though the operation was done frequently, it was always performed with a good deal of caution, as may be seen by referring to the earlier work of Paré* where instruments similar to those of Hildanus are figured. Fabricius ab Acquapendente (l. c.) boasted that his dexterity was so great, he did not have to use a forceps in cutting off the uvula, but depressing the tongue with one hand he used the scissors with the other.

The latter author† who must have written it about 1600, makes an interesting mention of tobacco in intra-nasal treatment. Sir Walter Ralieggh had brought the knowledge of the weed to England several years before, but he does not seem to have used a pipe for smoking it until after the return of Sir Francis Drake in 1586 (Lizars). Fabricius says: "They are accustomed in England to prepare a fumigation from Tobacco or Herba Regina Exsiccata, the smoke of which when ignited they draw through a slender pipe into the mouth, and by this the mouth being filled, so that the cheeks are inflated, it comes out of the nostrils. In England, as I have said, it is most

Tobacco
Therapy.

* Les Oeuvres d'Ambroise Paré. Lyon, Gregoire, 1664, p. 189.

† l. c. "De Suffumigo Anglico ex Tabaco, et Chirurgia Naso Orique Communis," Cap. XXVII.

frequently used, and with the happiest results." Gregory Horst* who wrote about the same time, and was enthusiastic as to the medicinal properties of tobacco in the treatment of catarrh and coryza, says: "Indeed the smoke of this ignited plant taken into the nose and mouth seems to benefit them, so that, as it were, by its resolving, cutting and attenuating properties, it causes the secretion and consumption of the mucus and viscid humors. For which reason, authors declare, the inhabitants of Florida, at certain specified seasons of the year, live on the smoke of this plant, which they receive into their mouth through horns prepared for this purpose, whereby, they assert, thirst and hunger are stilled, and an incredible amount of phlegmatic humors are collected in the mouth." So beneficial was this that some called it the "holy plant" or *Petum* or the Queen's plant. "When it is taken into the mouth through a pipe-stem, it pervades the whole brain, and in the same manner is borne into the ears and even the uterus. One of the signs of its efficacy is the paleness of the countenance." One may easily perceive traces of the experience of the first European novice to follow this curious habit observed in the new world. The old smoker needs only to recall his first pipe to understand the awe with which the first white man looked upon the potency of the new drug. The perusal of the literature concerning the medicinal virtues of tobacco in Queen Elizabeth's time, should furnish a fruitful source for reflection to those apt to be enthusiastic over new drugs. Pursuing this line of thought, I may be allowed to insert a citation, not from the veracious history of Diedrich Knickerbocker, but from sombre, musty, medical annals. Bontekoe, a Holland sage whose singular name, "pretty cow," would attract attention without the knowledge of his other peculiarities, was so impressed with the virtues of the products his countrymen were bringing from the West and the East Indies, as to declare there was nothing so conducive to long life and robust health as smoking countless pipes of tobacco, and drinking innumerable cups of tea.

Syphilis.

Whatever may be our belief as to the existence of Syphilis in the Ancient world and in the Middle Ages, none can deny that, if we are to judge alone from the medical literature of the day, apparently in the latter part of the fifteenth century, possibly before, certainly after the return of Columbus' sailors, Syphilis spread rapidly throughout Europe. The profligacy of the times, the wars of Italy, the indescribable misery and filth of the people, the wan-

* "Gregorii Horstii Senioris Opera Medica, Cent. Problem. Therapeut., Decas III, Quæstio VII, p. 47, Edit. 1661.

dering priests, jongleurs, beggars, robbers have been collected by the medical historian into a picture to explain the reason for the birth of many new diseases, which appeared first during the fifteenth and sixteenth centuries, but all these pretended causes had existed for a thousand years. Columbus did not bring with him whooping cough, scarlet fever, diphtheria and influenza. These all appeared, possibly with the exception of the last, to have arisen during the Renaissance of learning in Europe. It is difficult to be sure of the origin of any of them, but we may conjecture that all had previously existed and that the awakening of scientific observation at this time first brought about the literature, upon which we depend for their identification in modern nosology.

It is only the strikingly specific phenomena of diphtheria which permit our recognizing it in the works of Aretæus and Galen. Syphilitic lesions with their multiform and deceptive resemblances, with the insignificance of the initial lesion, may easily have been classed with the various affections which are at present grouped differently. It has only been within the last hundred years that tertiary syphilitic laryngitis has been separated from tubercular, both being included by Morgagni, Louis, Trousseau and Belloc, under the heading of laryngeal phthisis. There is no one word that is so comprehensive in its significance, when applied to the advance of knowledge in the history of Medicine, or indeed in the history of all science, as Differentiation, and this one word, I believe, will explain the birth of many so-called new diseases in medical annals. We can only conjecture that this holds true as to syphilis.

We have noted Berengar, reaping a rich harvest with the mercurial treatment of syphilis among the ecclesiastics in Rome, and we can scarcely peruse a medical book, published after 1500, that we do not find abundant evidences of the ravages of the disease, often unrecognized in its extragenital lesions. Sunken noses, perforated palate bones, laryngeal stenosis are forced on our attention. Forestus, who was familiar with the ravages of nasal syphilis, vividly describes the syphilitic ulcerations of the soft palate, recognizing the condition in a case he details, "though the noble youth denied it."

Various devices soon came into use for remedying the results of syphilitic ulcerations. Palfin* says that Amatus Lusitanus, a Portuguese Jew, who was born in 1511, and who succeeded in eluding the clutches of the Inquisition, invented an instrument "which is a blade of silver in the middle of which there is a hole, and through

Prostheses.

* "Anatomia Chirurgica."

this a piece of sponge may be passed and fastened firmly to the metal plate. This is then applied to the perforation of the palate in such a way that the sponge swelling with the humidity, the plate is held so firmly against the palate, and closes so exactly the opening, that it only can be detached with difficulty." Paré and Fabricius Hildanus also speak of a similar prosthesis. Paré indeed it was, who is said to have first performed the operation of staphylorrhaphy. Although he was familiar with the operation of Tagliacozzi, he suggested in cases of loss of the external nose, the use of an artificial one in the form of a mask*. Although Paré's treatment of a fractured nose was far inferior to that of Hippocrates, he figured the hollow splints he used, and elsewhere he says: "Now it is well to understand that the solution of continuity occurring in the cartilage is called fracture by Hippocrates, like those of the bone, because he had no other name to express it better."

Rhinoplasty.

In Celsus† plastic operations on the nose are very superficially noted, and the same may be said of Galen (Isagoge) and of Paulus Ægineta (VI, 26). The Arabians, in spite of their communication with India, and their opportunity of acquiring some of the medical knowledge of that ancient land, do not appear to have left any records of Rhinoplasty in their works. This is the more surprising, because there is every reason to believe, as Von Graefe asserts, that the Saracens introduced the art into Sicily.‡ With such a degree of skill were some of the Oriental practitioners credited, that tales were told in the Middle Ages, and even at a later date, of the executioners throwing freshly amputated noses into the fire, that they might not be picked up by friends and relations of the victim and afterwards sewed in place. Slaves, it is said, were in Sicily compelled to surrender their noses, at times, to masters who in the vicissitudes of the times had lost their own. A slight perusal of the history of Sicily will convince any one that this interchange of commodities might have been brisk, as an ordinarily active man might easily be master and slave several times, in the course of a moderately long life. There is a record of Branca§ having made a new nose as early as 1442, and he is said to have been preceded by even earlier surgeons. Branca, the father, made a nose of the neighboring

* "Chirurgie Livre," XXIII, Cap. 2.

† "De Medicina" Lib. VII, Cap. IX.

‡ For a more extensive bibliography see Cloquet: *Osphresiology*. Von Graefe: *De Rhinoplastice*, 1818. Zeis: *Die Literatur und Geschichte der Plastischen Chirurgie*, 1863. John Hamilton: *The Restoration of a Lost Nose*, 1864.

§ For reference to an old manuscript describing the rhinoplasty of Branca, father and son, see Gurlt: *Geschichte der Chirurgie*, II s, 489.

parts of the face, but his son Antonius used the skin of the forearm. The art seems also to have been practiced in Sicily in the sixteenth century by a family of the name of Vianeo.

Baas remarks "that syphilis, and a nose destroying pope, who fixed upon amputation of the nose as a punishment for larceny, afforded the most frequent occasion for these rhinoplastic operations." He refers to much later times, viz., the pontificate of Sixtus V (1585-1590). Earlier than this, Lanfranc, Chauliac, Cerlata, and other surgeons, refused to believe these marvelous stories from Sicily, but the operation is mentioned before Tagliacozzi published his work (1597), by Vesalius, Fallopius, Paracelsus and others. Benedetti, who died in 1525, is said to have been the first in Europe who speaks of artificial restoration of the nose, except those authors who ridiculed the possibility of it. I have mentioned Paré's idea of an artificial nose. Tycho Brahe, the early astronomer, a choleric philosopher, in 1566 lost his nose in a duel, and is said to have supplied the defect so skilfully with gold, silver and wax it was scarcely noticeable. Fabricius Hildanus,* in a letter to Griffonius, speaks of having seen a case in which the nasal organ had been restored by operation, after the method of Tagliacozzi, and from Griffonius' reply, we learn that he himself had learned the method from Tagliacozzi himself on one of his many journeys. This, and many other such references in the literature of the time, indicate that to the latter is due the credit of having brought the method in vogue on the continent, though his book† was not published until long after the operation was well known. His operations were elaborate and ingenious. He used not only the adjacent parts of the face in the repair of the nose, but the skin of the arm, having apparently derived the idea from his knowledge of tree grafting. His restorations of the ears and lips were not less admirable and ingenious. Such operations have always excited much merriment among the wits of the laity, and we find Butler, in his famous "Hudibras," declaring:

"So learned Taliacotius, from
The brawny part of porter's bum,
Cut supplemental noses, which
Would last as long as parent breech;
But when the date of Nock was out
Off dropped the sympathetic snout."

Van Helmont‡ gravely supplies science with the account of this

* "Opera Omnia," Edit. 1619.

† "De Curtorum Chirurgia per Insitionem, seu de Narium et Aurium Defectu per Insitionem, Arte hactenus ignota sarciendo," etc., 1597.

‡ "De Magnet. Vuln. Curat.," 22, p. 598; Ref. Daremb. (l. c.), I, 477.

tragic episode: "A citizen of Brussels, having lost his nose in a fight, applied to a surgeon, named Tagliacozzi. The latter, in order to cure him without resulting deformity, made use of autoplasty, and borrowed a strip of flesh from the arm of a servant. The wounded man returned home with his borrowed nose. Thirteen months later he was all at once disagreeably surprised to find the organ growing cold and becoming gangrenous. What had happened? After much lamentation and inquiry it was learned that the servant from whose arm the nose had been taken at Brussels had died exactly at the time the nose began to grow cold. * * * There are eye witnesses at Brussels of this fact."

In the *Tattler*, No. 260, Addison continues to make merry over the misfortunes of the early victims of syphilis, pointing out how appropriate it was, in the painting of Corregio, to represent the dimpled God of Love taking lessons in archery from Mercury. He affirms that his arrows were dipped in poison and the boy aimed them at his quarry's nose, not his heart. Taliacotius was the first "clap-doctor," whom Addison had met with in history, and was very celebrated, but he had made the awkward mistake, in the case referred to in "*Hudibras*," of grafting on a swarthy Portuguese's features epidermis removed from that part of the anatomy of a fair-skinned German which is not exposed to the sun's rays. There is much more of this sort of banter, which seems to have been acceptable to the readers of this classic English author in his day. In spite of much indelicate but merry satire of this kind, so brilliant were Tagliacozzi's real results that the theologians, continually on the alert for that sort of alliance in others, considered him in league with the devil, or, at least, exceedingly impious in presuming to engage in a work they were bold enough to ascribe exclusively to the Almighty. Some nuns declared after his death (1599) they heard a voice exclaiming that he was damned, so they dug up his body from consecrated ground and cast it out. Thereupon his colleagues in the anatomy school at Bologna raised a statue to him, where he stands immortalized, a nose in his hand. (Whittington.)

Having noted the advent of Syphilis in medical history, and its influence upon the diseases of the nose and throat, we now take account of the other contagious diseases which become prominent in the records at this time. Except for accounts of sporadic cases of diphtheria, which we are able to recognize in the very oldest records of medicine, reports of Influenza, unnoticed by the Greeks and Romans and Arabians, were the first to emerge from the ob-

scurities of the Dark Ages. While Creighton* makes a doubtful reference to the disease, reported as early as 1173 A. D., Ozanam† says of Catarrhal Fever: "One of the oldest epidemics of this time, of which there is no mention since the beginning of the Christian era, is that of the month of August, 1239, which one finds noted in the chronicles of the Frères Mineurs. The same chronicle speaks of another in 1311 in France, where many perished from it." He speaks of it as occurring in Florence in 1323, throughout all Italy in 1327, and there was another epidemic in 1358, again in 1387 and 1400. In France records report it in 1403, 1410, 1411, 1414, 1427, 1438, 1482, 1505. Creighton finds traces of it as occurring in England during the reign of Henry VI (1427). If it is really influenza which is referred to, according to Creighton, by Rodolphus de Diceto as occurring in 1173, we may see from the phrase "Universus orbis infectus ex æris nebulosa corruptione," that his idea of the etiology was quite excusable. Anglada‡ quotes Felibien as follows: "In 1414 there prevailed a northwind so contagious that it caused a very frequent disease which they called 'coqueluche,' 'the tac' or 'the horion.' It was a kind of a cold, which caused such hoarseness that the Parlement and the Chastelet were obliged to interrupt their sessions. There was loss of sleep, great pains in the head, in the loins, and throughout the rest of the body; but the disease was not mortal except in old people." The French names for it were Influenza, Coquette, Petite-Poste, Follette, Horion, Tac, Grippe. The word Influenza was not adopted in England until 1743, the early English designation being "Mure" or "Murre," probably from the same root as "Murrain." It was occasionally called "the new disease." De Thou in his Universal History speaks of it as occurring in 1580§ thus: "A new disease, called in Italy Vervecinus (pertaining to a sheep or a wether) which first proved deadly in the East, then in Italy and later in Spain; for from this Anna, the wife of King Philip (II of Spain), died, and Gregory XIII (who reformed the Calendar) was dangerously ill with it." It is probable that King Philip had also been ill with it, for we read in Prescott an affecting account of his devoted Queen, his third consort, praying that he might be spared and she taken, a supplication which was granted. De Thou speaks of the astounding rapidity of the progress of the disease, and enumerates

Nomencla-
ture.

* History of Epidemics in Britain, Vol. I, p. 398.

† Des Maladies Epidemiques, Tome I, p. 260.

‡ Etudes sur les Maladies éteintes et les Maladies nouvelles.

§ Ozanam has made a mistake, evidently from misconstruing the Latin text, in referring De Thou's remark to 1510.

some of its striking symptoms. He also says that "Coqueluche" is a name first given to it in 1510, but we have noted this name in Fillibien a century earlier. It was in this latter year, according to Creighton, that Erasmus suffered from it. According to the same authority, that lovely, wicked, puzzling heroine of history, Mary Queen of Scots, is said to have suffered from it in 1562. We find in the old Latin and French works the word *coqueluche*, *coccolucie*, and it is thus frequently indistinguishable, as is occasionally the disease itself, from whooping cough, the first intelligible account of which was given by Ballonius in 1578, though Sprengel refers to Mezeray as mentioning the occurrence of whooping cough in 1414, when, as we have seen others speak of an epidemic of Influenza, Sprengel (III—85) says this French name for whooping cough arose from the hood or "cucullio" with which the sufferers covered their heads in France in the epidemic of 1510, or perhaps from *Coquelicot*, the name of an herb, which was at first employed in the treatment of it. I have been thus prolix in the account of the confusion as to this French term, and the evident confusion of the diseases, for which it stood, in order that the lack of differentiation of two distinct maladies may be seen, a little prior to the time when the separate study of the affections began. As a matter of fact, we may plainly perceive that in this instance we have now no means of knowing, with surety, what epidemics were whooping cough and what were influenza, in and before the sixteenth century. We may venture to apply the lesson thus learned to the apparent origin of other epidemic diseases, and we recognize that new knowledge was coming in to the world to bless mankind, and not new diseases to afflict it. Ballonius' description unmistakably identified whooping cough*. He himself declared he had never read an author who had given a description of it. Notwithstanding the assertion of Sprengel (V 595) that Hoffmann first described Influenza in 1709 under the name of Catarrhal Fever, it is evident from the following citation that he was preceded by many years by Willis, who, describing the Catarrhus Febrilis of 1658, says:† "About the end of April an affection suddenly blazed forth which, as though blown from the stars by some sudden gust, all at once fell upon many, so that in some towns in the space of one week, more than a thousand men were prostrated. The pathognomic symptom of this disease, and that which first attacked the patients, was a troublesome cough with profuse expectoration and catarrhal discharge from

* *Epidemiorum et Ephimeridum Libri II.* Edit. 1640, p. 237.

† Willis: *Opera Omnia*, Edit. 1682. De Febris, Cap. XVII, p. 202.

the palate, throat and nares. There was febrile disturbance, which was accompanied by heat, thirst, prostration, unaccountable lassitude, and severe pain in the back and limbs." "Many of those of weaker constitution succumbed, but the strong recovered." He himself died of it in a later epidemic (1675).

Hoffmann* speaks of it as a quotidian remittent fever epidemic in 1709. Juch† describes the catarrhal fever raging as an epidemic in 1741 in many provinces of Germany, and Huxham‡ says that the catarrhal fever which spread through all Europe under the name of the Influenza in 1743 frequently became pleuritic or peripneumonic. John Fothergill§ speaks of an epidemic which appeared in London in 1775, and many physicians replied to his circular letter inquiring into it, since it prevailed generally throughout the British Isles, where it was at that time known as the Influenza.

These accounts do not by any means include all the records of epidemics of Influenza occurring before the nineteenth century, but are sufficient to prove its frequency and its antiquity. It is hardly worth while to pursue the history of it further.

Again it is in the sixteenth century that the description of an epidemic of diphtheria is first to be noted. It is to be found in the works of Forestus|| "Anno 1557, a Christo Salvatore nostro nato, mense octobree, gutturi morbus epidemicus adeo Alcmariæ grassabatur, ut integras familias subite invaderet; ita ut inter duos tresve septimanas ex hoc malo in eadem urbe ultra ducenti homines extincti sint."¶ Forestus seemed to think the disease arose from a certain wind, which, with a dense, bad smelling fog, had preceded it. Wierus, a German physician, described an epidemic occurring in 1563, and Sanné refers to a passage in Ballonius, which, by the way, I cannot find, where a membrane is described as having been found in the trachea on autopsy in 1576. Ludovi-

Diphtheria.

* "Opera Omnia," Edit. 1740, p. 47-48. (Sprengel.)

† Juch: "Disputationes ad Morborum Historiam," Haller, Tomus V, p. 297.

‡ An essay on fevers, etc., etc.

§ "The Works of John Fothergill," Edited by Lettsom, 1784, Vol. III, p. 251.

|| L. C. Liber, VI, p. 1—De Febris publice grassantibus. According to Chauveau (Annales des Maladies de l'Oreille, etc., etc., Nov. 1901) Paracelsus described diphtheria under the name of "Prunella" before either Forestus or Baillou.

¶ This little city of Alkmar in the Netherlands where Peter Forest saw and described an epidemic of diphtheria, and where he himself contracted the disease, was sixteen years later threatened with another calamity. "If I take Alkmar," writes the Duke of Alva to King Philip, "I am resolved not to leave a single creature alive; the knife shall be put to every throat." "Motley's Dutch Republic," Vol. II, p. 464. The bravery of the inhabitants saved them from this merciless fate.

cus Mercatus*, who died in 1599, gives a long account of the epidemics in Spain in 1583 and subsequent years. It was called Garrotillo, after an instrument the Inquisition had made them familiar with, which was used to strangle people. He described the membranous condition of the throat as "pustules of various colors, especially verging towards the black, surrounded by foetid mucosities, with putrefaction and softening of these parts." A child bit the father's finger, while he was attempting to extract membrane from his child's throat, and he died two days later of the disease, which phenomenon excited the wonder of the author, who had referred the causes to changes in the patient's temperaments, or to atmospheric conditions. Thomas Bartholinus†, writing in 1646, says that the "Suffocative Angina of children is like an epidemic disease, which from the year 1618 like a pest attacked children, and infected and killed others at Naples." "From the effects of the comet of the year 1618, Elisæus, a learned physician of this city, deduced the virulence of this disease." Gurlt (l. c.) gives the following extract from the brochure by Andrea Sgambato, "De pestilente Faucium," relative to an epidemic of diphtheria in Italy in 1617, after the appearance of three comets in the sky: "The torches of the comets were not yet extinguished, when a pest began to rage among the children which at first, especially in winter, spared no one. With such celerity did the infection pass from one to the other, that in a few days a father had to mourn the loss of all his children. It spared neither rich nor poor, and ravaged places apparently salubrious in the country before the city."‡ In the form of a commentary on Aretæus' work on the subject, Marcus Aurelius Severinus describes his experience with the pestilential sore throat at Naples in 1618§. Bretonneau in the Additions to his work (l. c.) transcribes an extract from a letter of Chisi (1748 ?), concerning the disease, which is clearly identified in the description he gives of an attack in his own son followed by diphtheritic paralysis. Huxham, whose notice of the disease in 1775 is included in his essay on Fevers (l. c.), ascribes to Fothergill, in 1748, the first accurate account of malignant ulcerous sore throat in England. Dr. Francis Home, of Edinburgh, in 1765,

* "Ludovici Mercati Opera Omnia."

† "Epist. Med.," XLIX Centur., I, p. 205, Edit. Hague, 1740.

‡ Bretonneau: "Des Inflammations Spéciales du Tissu Muqueux et en Particulier—de la Diphthérie", 1826, translates Carnevale's description of the epidemic in Naples in 1618, following the comet (De Epidemico Affectu). He also gives extracts from several ancient authors I have not had the opportunity, or have not taken the space to mention.

§ "De Recondita Abscessum Natura," Frankfort, 1643.

published his famous work on the disease in the larynx, to which he was the first to give in medical literature the Scotch word of croup.* It was a work which for a long time was widely quoted, but apparently it included many cases of spasmodic laryngitis in children, as indeed continued to be the case in the diagnosis of diphtheritic croup, until the advent of bacterial classification. If the differential diagnosis is here at fault in comparison with modern knowledge, it is still more so in many other reports, in which it is impossible to be sure that scarlet fever was not included in the category of malignant sore throats. In very many of the reports, this is self-evident. Scarlet fever, which becomes first clearly recognizable in the works of Ingrassias (1510-1580) as Rossalia, and in that of Ballonius (l. c.) as Rubiola, was first called "febris scarlatina" by Sydenham. It has often appeared as an epidemic when diphtheria has also been prevalent. This confusion is noted in the early work of Fothergill,† who first noted these throat disorders in England in 1739, and the same criticism may be applied to the work of Huxham. This is still more apparent in the early American accounts of throat epidemics. Dr. William Douglas communicated to a medical society in Boston his observations, which had as a title, "The Practical History of a New Epidemical Miliary Fever with an Angina Ulcusculosa,"‡ which raged in Boston, but first broke out in Kingston township, fifty miles eastward of Boston, on the 20th of May, 1735. Dr. Douglas, however, as may be judged from the title, did not recognize it as the disease described by Forestus. Dr. Cadwallader Colden, in 1735, is said also to have published a treatise on "The Sore Throat Distemper," and it is to him that Samuel Bard, M. D., in 1771, dedicated his essay, "An Inquiry Into the Nature, Cause and Cure of the Angina Suffocativa or Sore Throat Distemper,"§ a work so highly esteemed by Bretonneau that he translated it into French. Dr. Jonathan Dickinson, the first president of Princeton College, also described the epidemic of 1734-1735 in a letter from Elizabethtown, N. J., to a friend, which was afterwards printed as a tractate in 1740, "Observations on That Terrible Disease, Vulgarly Called the 'Throat Distemper.'" Angina was epidemic many times in New England from 1733 to 1787, and, without a

Confusion
with Scarlet
Fever.

* "An Inquiry into the Nature, Cause and Cure of Croup."

† "Works by Lettsome," I, 365.

‡ *Vid:* "An Essay on Scarlet Fever." Caspar Morris. 1853. Appendix.

§ A very rare book, I believe, but to be found in the library of the New York Academy of Medicine.

doubt, this was probably both scarlatinal and diphtheritic according to our present nosology. Perhaps no better example of this undifferentiated state of acute throat inflammation can be found, after the decline of the Hippocratic pathology and the classification of Aretæus, than in the works of Christian Gottlieb Ludwig,* whose namesake, eighty years later, gave the patronymic to a well-marked septic condition of the pharynx. The eighteenth century Ludwig drew a sort of composite picture, which in a few years was to begin to undergo a process of resolution into its component parts. Nevertheless modern differentiation of throat affections may be said to have begun at this time. Rush† and Chalmers‡ evidently confounded spasmodic and diphtheritic laryngitis, but Rush later, in his works, recognized them as two different diseases. John Millar, to whom Rush addressed a letter on the subject, described "pseudo-croup" and wrote on the asthma and whooping cough in 1768-69. Wichmann,§ in 1794, still further developed the differential diagnosis, Michaelis having, in Germany, exhaustively described true croup in 1778.

An account of the history of tracheotomy naturally follows that of diphtheria. Since the days of Paulus Aegineta, who himself simply quoted from an earlier author, the opening of the air tube was described by the majority of systematic medical writers, but apparently practiced by none whose records have reached us until the time of Brasavola. Numerous Arabian and pre-Renaissance writers mention it. Lisfranc, Nicholas Florentinus, William of Salicet, Petrus d'Abano, all make reference to it. Some have ascribed to Beniveni, who died in 1502, the first actual operation, but a reference to the 1507 edition of his book|| discloses the fact that his operation was an external pharyngeal incision into a peri-pharyngeal or perilaryngeal abscess, and by no means a tracheotomy, though it was successfully done for the purpose of relieving dyspnea. It is doubtful whether Guido-Guidi ever performed the operation, though he recommends and describes that of Antyllus as a desperate resort, and he describes and figures silver and gold tracheotomy tubes.¶ He was a friend of Cellini, and died in 1569. Casserius ascribes to Brasavola, who died in 1555, several operations for tracheotomy, the

* "Institutiones Medicinæ Clinicæ," 1758, p. 134.

† "Medical Inquiries and Observations."

‡ "An Account of the Weather and Diseases of South Carolina," 1776.

§ "Ideen Zur Diagnostik."

|| "De Abditis Nonnullis ac Mirandis Morborum et Sanationum Causis." Obs. XXXVIII.

¶ "De Curatione Membratim Vidi Vidii Junioris." Liber VIII, Cap. 5.

first operation being, according to Sanné, in 1546. Brasavola is quoted as saying: "When there is no other possibility, in angina, of admitting air to the heart, we must incise the larynx below the abscess," etc., etc. (Holmes.)

Casseri^{us} practiced the operation which his master, Fabricius, described and defended. Casseri^{us}' work* is a very fine dissertation on the anatomy of the larynx and the ear, but his description of the operation of tracheotomy which he himself performed is not equal to that of Fabricius, who never did the operation.

Gurll† seems to understand that Casseri^{us} incised the tracheal rings, but I do not understand that the "divisis annulis" is to be so construed, but rather that they were separated, as in the operation of Antyllus. This is borne out by the description of Fabricius, and by the subsequent history of the operation. It is probable that the difficulty in differential diagnosis, as to the site of the obstruction in respiration, at a period before they knew anything either of laryngoscopy or of the physical diagnosis of pulmonary conditions, and perhaps the lingering criticism of Aretæus, that it was the "pneuma" itself or the vital principle which was affected in these cases, caused physicians to falter in what, to us, seems the most pressing of indications for operative interference. The dangers of the operation were also grossly exaggerated. So well did Casseri^{us} appreciate these fallacies that he declared that those who rejected bronchotomy are "inhuman, awkward, timorous, and are even, as it were, to be held as homicides." Casseri^{us}' work was published 1600 and that of his master, in which I have found the reference to tracheotomy, in 1617. Apparently, therefore, he preceded him in the boldness with which he advocated the operation. Certainly he surpassed him in having himself performed the operation. Since, in Fabricius' long dissertation on the subject, he does not allude to Casseri^{us}, who was his favorite pupil and his successor, we may conjecture that the former's chapter on the subject must have been written, at least before Casseri^{us} published his book.

It is thus that Fabricius ab Acquapendente, in florid Latin, eloquently praises the operation of opening the Aspera Arteria:‡ "Of all the surgical operations, which are performed on man for the preservation of his life by the physician, I have always judged to be the foremost that by which man is recalled from a quick death

The Operation
of Fabricius.

* De Vocis, Auditusque Organo, Historia Anatomica, 1600.

† Geschichte der Chirurgie, II, 487.

‡ "Opera Chirurgica," De Chirurgicis operationibus, Cap. 44, Edit. 1723.

to a sudden repossession of life, a feat which raises the surgeon nearest to the level of Æsculapius; that operation is the opening of the Aspera Arteria, by which patients, from a condition of almost suffocating obstruction to respiration, suddenly regain consciousness, and draw again into their heart and lungs that vital æther, the air, so necessary to life, and again resume an existence which had been all but annihilated." Fabricius reviews the disputes of former authors as to its utility, and says that it is useless when the lungs are affected and the whole trachea is full of material. "It is justifiable, in short, when the obstructing matter is only in the larynx above the place of incision. When below, it is to be refrained from." He assures us, contradicting himself somewhat, that even when there are some signs that the trachea is full, we should still operate. To escape the criticism of perhaps hastening death, "and because from the operation no small emolument may be derived," he advises that the patient's friends should be told of the desperate nature of the case. The operator should be a good anatomist. The fauces should be first explored with the finger, alone or armed with a short knife, bound to it in order to rupture any abscess which may be present, but if the trouble is in the larynx this is of little use. He is the first (unless it is Casserius) to criticise the transverse skin incision of the ancients, and counseled that it should be made vertically over the third and fourth tracheal cartilage. He defends the operation against the criticism of Aretæus with quite modern arguments. As for the cartilage not healing by primary intention, would it not heal by secondary? But even if it should not heal, the soft parts would sufficiently cover it. A longitudinal mark with ink was to be made down the middle line of the neck and a cross mark at the point of tracheal incision—scarcely the breadth of a thumb below the lower border of the larynx. Fabricius describes the canula more explicitly than Guido. Straight and curved canulæ were in use, but Fabricius preferred the former. He declares that the surgeons of his own time, frightened by the warnings of the ancients, *have not* performed the operation, nor has he himself done so. Notwithstanding this work of Fabricius seems first to have been published in 1617, though presumably written several years earlier, it cannot be doubted that the operation was more common than we should infer from his remark, for Ballonius† in 1574, in considering the advisability of the

* The cartilage is always spoken of, but of course it is the tissue between the rings which is referred to.

† "Opera Omnia," Tom. I, p. 163. *Epidemorum et Ephemeridum*, Lib. II.

operation, said: "Of course it is dangerous, but if it is done by a skillful hand, which knows how to avoid the recurrent nerves, it is free from danger. It promises certain safety. At any rate it is better to try a doubtful remedy than none, and it may be that it is omitted to the great detriment of patients." It is probable, therefore, that Fabricius' work on the subject had been written before that of Casserius, and it is evident that the operation had been growing in favor in the fifty years which had elapsed since the time of Brasavola, and had probably been often performed in that time. Marcellus Donatus in his curious book*, first published in 1586, strongly urged tracheotomy when indicated, and in spite of the little esteem which his work has met with at the hands of the historians, he was one of the first to urge the pressing importance of post-mortem examinations. Habcot†, who was something of a charlatan, published a tractate entitled: "Question chirurgicale, dans laquelle il est démontré que le chirurgien doit absolument pratiquer l'operation de la bronchotomie, autrement la perforation de la flute ou tuyau du poulmon" (1620).

His experience consisted principally in two operations on persons not affected with angina, one a wound of the larynx and another a case of foreign bodies—gold pieces—in the pharynx. He describes the size and forms of tracheal canulæ. Louis, who has given a most excellent history of the operation,‡ quotes from Fonseca, a Portuguese author who died in 1632, the curious history of a young surgeon of London who was bribed to attempt to save the life of a robber who was to be hung. He made an incision into the trachea and inserted a tube. The noose failed thus to shut off the malefactor's breath, but, being a heavy man, although life was not extinct when the body was delivered to his friends, he died, very shortly after regaining consciousness, from the effect of his great weight producing other fatal damage.

Sennert,§ a voluminous writer in the early part of the seventeenth century, who, on a careful inquiry into the efficacy of birds' nests in angina, came to the conclusion it was due to the bird's dung mixed with the dirt, approved of tracheotomy in desperate cases, if performed by skillful hands. In 1646 the question of tracheotomy was discussed in the letters of Thomas Bartholinus and Moreau. || The

* "De Medica Historia Mirab.," Lib. III, Cap. 1, 1613.

† See extract from his work cited in "Dict. Hist. de la Medecine," sub voce.

‡ "Sur la Bronchotomie." *Memoires de l'Academie Royale de Chirurgie*, 1784. T. IV, p. 455.

§ "Opera Omnia," Tom. II, Lib. II, cap. 24, Edit. 1641.

|| "Thomæ Bartholini Epistolæ Med. Centur.," I Epist., LXXX and LXXXI, Edit. 1740.

latter says, writing from Paris: "As for me, I have seen innumerable people, suffering with angina, saved by venesection alone from the arms, so often praised, fewer carried off by the neglect of the administration of remedies at the proper time, and a very few in whom bronchotomy might have been judiciously and seasonably used." He describes the operation he performed on a soldier, in which he made use of the transverse incision, and used a curved leaden tube with strings to attach it around the neck. He had performed it also in children, and one should not wait until they are nearly suffocated, he says. In them a shorter tube is to be used. In another work of Bartholinus* he mentions that John Van Horne, in dissecting the body of a man dead of phthisis, pointed out, among other operations, the place for a laryngotomy. Although Sprengel asserts (VII, 144) that Frederic Dekkers was the first to recommend paracentesis of the trachea in a work published in 1694 on bronchotomy, Sanné states that, according to Malavicini, Sanctorius (died 1636) first made use of a trochar, the canula of which he left in the wound for three days. This procedure, laryngocentesis, was also described in 1748 by Garengot.† For the reasons suggested, or perhaps for others less apparent, tracheotomy found its way into favor very slowly. The singular mistake of Detharding,‡ in the early part of the eighteenth century, although it doubtless caused many useless operations, must have done much to familiarize the profession and the laity with the operation. His advocacy of tracheotomy in cases of drowning, advanced in 1714, arose from the observation that the lungs and the stomach of a drowned person did not contain the water, which had formerly been supposed to be the cause of their death. As one of his arguments he cites Wepfer, from whom we have had occasion to quote, as having incised the trachea of a beaver after having been held under the water until drowned, and as having been unable to press any water out of the lungs. He supposed that the structure and action of the glottis and epiglottis prevented, not only the entrance of the water, but frustrated the subsequent efforts at artificial respiration. He counseled, therefore, doing a tracheotomy and blowing air into the lungs. While this idea was frequently put into practice by many eminent surgeons for more than a hundred years, it never was universally accepted as a proper procedure, and it finally fell into disuse.

* "*Acta Medica Hafn.*," T. I. Edit., 1673.

† "*Traité des Operations*," etc., 2d Edit. Perhaps also in the 1st Edit., 1720.

‡ "*Epistola ad Luc. Schrockheim*. Haller's *Disputationes Chirurgicæ*," T. II, p. 428.

We now note the first great advance in the technique, since the first mention of the operation. Although others, as Casserius and Fabricius, had declared that cut cartilages healed kindly and easily, division of them was always avoided. Juncker*, in 1721, said of bronchotomy, that some advised the ring to be cut, which allowed more convenient placing of the tube, but he thought this renders the healing more difficult, and he advised that it should only be done for foreign bodies, in which case many rings may be cut. A little before this time, Heister† apparently first advised the division of the rings as a routine practice. He speaks of tracheotomy in the "Bräune," and for resuscitation of the drowned. Platner‡ in 1758 approved of bronchotomy, when necessary, in angina, and says it is safe to cut the cartilaginous rings. He did not approve of paracentesis. Vic d'Azyr§ in 1776 communicated, to the Royal Society of Medicine of Paris, his reflections on the possibility of laryngotomy between the thyroid and cricoid cartilages.

The Modern
Operation.

According to Sprengel, Desault was the first who practiced laryngotomy, splitting up the thyroid cartilage in an individual in the larynx of whom a foreign body had lodged. While Desault urged the propriety of such a procedure in cases of this kind, I find no record of the fact that he performed it, in any of the many editions the great Bichat issued of his works. We have noted a similar suggestion in Juncker, in regard to the tracheal rings. Pelletan|| records a case, operated on in 1788, in which he did a laryngotomy, dividing the thyroid cartilage in order to push down into the oesophagus a foreign body arrested at that point. The man recovered but remained hoarse, and according to Pelletan such will always be the case when the incision includes the larynx. In another case (Obs. IV) in 1805 he divided the cricoid cartilage alone. Holmes attributes the origin of the modern tracheotomy tube to A. G. Richter, who published his *Obs. Chirurg.* in 1776.

Laryngotomy.

Tracheotomy
in Diphtheria.

From what has preceded it is evident, I think, that many of the cases in which tracheotomy had been done, were suffering from diphtheria, but when Bretonneau wrote his great treatise¶ he

* *Conspectus Chirurgiæ*, p. 665.

† *Chirurgiæ*, I., 1718.

‡ *Institutiones Chirurgiæ*, 1758.

§ *Hist. de la Soc. Royale de Méd.*, 1776.

|| *Clinique Chirurgicale* I. I. P. I. Edit. 1810. Obs. 7.

¶ *Traité de la Diphtheria*, 1826.

cited from Borsieri the report of an operation, as the first instance in which it was clearly evident that the obstruction to breathing, for which it was done, was due to croupous laryngitis. It was performed by Andrée, a skillful London surgeon, in 1782. upon a five-year-old boy, who recovered in fifteen days.*

INTRA-NASAL SURGERY AND PATHOLOGY OF THE SEVENTEENTH AND EIGHTEENTH CENTURIES.

Operations for
Nasal
Polypi.

We will now turn our attention to that part of intra-nasal surgery which has always occupied, to some extent, the activities of medical men—the removal of nasal polypi. We have seen the skillful procedures of Hippocrates. We have seen the barbarous modifications of them by Paulus and the Arabians with their knotted strings and little saws. Velpeau,† who gives a very much fuller account of the ancient history of this subject than I can find room for here, refers to a procedure I have not elsewhere met with in my reading. He says that William of Salicet proposed the gradual dilatation of the anterior openings of the nostrils with a sponge, or some other device, to render avulsion of nasal polypi easier of execution. The knotted strings of horse hair and of silk were soon abandoned after the Renaissance, and in 1571 Aranzi or Arantius, in giving an account of his method of dealing with nasal polypi, describes not only a forceps with long jaws he had invented for the purpose, but he gives still more interesting details of his way of illuminating the anterior nares.‡ He speaks of the difficulty of blood obstructing the view in the use of the knife, and to obviate this he constructed his long forceps. He obtained illumination by placing the patient in a darkened room and making a hole through a wooden shutter to admit the ray of light, which was to fall directly into the nasal cavity, which he rendered more patent by raising the end of the nose. On cloudy days he used artificial light, magnified by a water bottle.

Remembering that in the sixteenth century not only were the Greek medical works more faithfully translated into Latin, but that they were more widely read in the original, we may easily conjecture that Fallopius§ drew his idea of the wire snare for nasal polypi from the works of Hippocrates, but it differed very much from the devices

* The reader is referred to the treatise of Sauné on Diphtheria, to Gurlt's History of Surgery, and to Louis "Sur la Bronchotomie" (l. c.) for a fuller account of the operation.

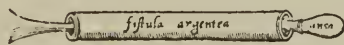
† "Nouveaux Elements de Medicine Operat.," T. III, p. 595, 1839.

‡ "Julii Cæsaris Arantii, De Tumoribus Secundum Locos Affectos," p. 172.

§ "Institutiones Anatomicae," 1600; "De Tumoribus Narium," p. 296.

Fallopius' tractate De Tumoribus præter Naturam was first published 1573, and the publication of his snare dates back to that, but he died in 1562.

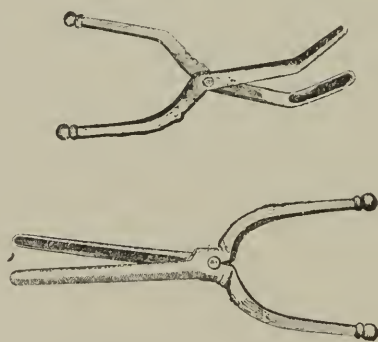
the latter employed, and it is in very fact the modern nasal snare of Jarvis, without the wheel, of which all others at present in use are modifications. By Fallopius' reference to nasal hemorrhoids we also perceive he was familiar with the Arabian pathology, but he makes a distinction between them and ordinary polypi, practically much as we now do more exactly. The hemorrhoids were our vascular hypertrophies, and the polypi were our edematous growths, the former being noted far back in the nose (posterior parts of the inferior turbinated bones?), and the latter being situated in more accessible regions, as a rule. For the cure of the anterior growths he used the ligature, leaving it around the growth for two or three days, when it would fall off with the constricted mass. This method he did not apply to hemorrhoids or "carunculæ" in the back part of the nose. He says: "But when the polypus is well within the nose it is difficult to use the ligature, which should encircle the roots of the polyp." He mentions the forceps operation of Paulus and continues: "But I take a silver tube which is neither too broad nor too narrow, and then a brass or steel wire, sufficiently thick, preferably the iron wire from which *harpsichords* are made. This doubled I place in the tube so that from this wire a loop is made at one end of the tube, by which, used in the nares, I remove the polyp. When the polyp is engaged in the loop, I push the tube to the root of the polyp, and then pull on the metal threads sticking out at the lower part of the tube, and thus I constrict the roots of the polyp and extract it, since by this wire loop the root of the polyp is cut because it is a soft substance." Harder growths he pulled down so that he could cut off the roots with a knife.



Fallopius' Nasal Snare.

Fallopius praised his instrument as very efficacious, and he used it also for polypi of the rectum. He condemns strongly the use of a cautery through a speculum, regarding the practice as dangerous. He also speaks of the string sawing method, which he had never used. His is the first improvement on the method of Hippocrates in removing nasal polypi. Fallopius died in 1562, two years before his much admired preceptor, Vesalius. The description of his snare was not published for many years after his death. Rhinologists cannot fail to be struck with the appearance, at such an early date, of what is practically a modern instrument. For

some reason the advantages of the steel wire were not appreciated, and the instrument was not destined to come into use until it had been reinvented after the development of other adjuvants of intra-nasal surgery. Many snares and devices for tying ligatures around polypi were subsequently invented, but without the elastic steel wire they were little, if any, superior to the intra-nasal forceps. These latter, though used by Aranzi and even by earlier operators, came into favor principally through the advocacy of Febricius ab Acquapendente. Gurlt speaks of Dalechamps, a French surgeon of about the same period, using an instrument similar to Aranzi's, but Paré knew no better treatment for polypi than local applications and the cautery. The forceps invented by Fabricius were really scissors curved at the end. There were many modifications of them. Thus John Van Horne (1621-1770) added teeth to their points to seize the polyp with.



Fabricius' Forceps for Nasal Polypi.

Thomas Bartholinus relates to a fatal case of hemorrhage from their use, although Fabricius had boasted they were entirely safe (*tutissimum*).

Riolan* (1577-1657), in his works, illustrates the general practice in regard to intra-nasal surgery of this kind, which we may see was inferior to either the procedures of Fallopius, or of Fabricius, for the removal of polypi. He mentions five methods: 1. Astrin-
gent, and other local applications of drugs. 2. The operation of Celsus and Galen—cutting with a flat-pointed probe and burning the roots with a cautery. 3. When coming down behind the

* Opera Omnia: Morbi Narium.

palate, pull it down with the forceps and cut it off. 4. It may be burned, or 5, cut off with horse hair in the manner recommended by Mesua.

Glandorp, in whose tractate* published in 1628, full references will be found to previous literature, apparently was ignorant of Fallopius' instrument, for his own device was greatly inferior to it, though it, unlike the earlier and better snare, was adopted and modified by many subsequent operators. It was a sort of a hook, a shank with a curved end and an eye at the point, through which a waxed silk thread was to be passed. A knot being firmly tied and the thread twisted, the polyp was thus ligated until upon the ninth day it would fall away. Fabricius Hildanus used a seton in the nose, and tried to get rid of the polyp by suppuration. More than 200 years after Fallopius' death, Levret published, in 1771†, a most elaborate and exhaustive treatise, containing accounts of the most ingenious and complicated instruments for the ligation and extraction of polypi. Notwithstanding their ingenuity, they seem utterly worthless viewed from a modern standpoint.

Much more practical and efficient, it would seem to us, were the instruments of Benjamin Bell.‡ Although Heymann asserts that the first mention of Belloc's sound is to be noted in the work of Deschamps in 1805, a similar instrument is to be found described in Bell's work. He figures different forms of snares and forceps for removing nasal polypi. The best of the former is perhaps a double canula, in each tube of which the end of a pliable wire was to be inserted and drawn through, leaving a loop at the end. The double canula was then, after adjustment to the polyp, revolved in the nose, which, twisting the wire, constricted the polyp. The apparatus was then left in the nose, tightened at intervals, until after a few days the growth came away. Some of the operations performed with forceps were of the most atrocious nature. For the details of a revolting operation for polypus nasi, I commend the reader to descriptions in Le Drans works.§

After failure of evulsive methods, he used a seton saturated with some medicament of a styptic nature.

Percival Pott,|| who mentions the wire snare, declares he has seen the septum and pieces of the palate pulled away by the

* *Tractatus de polypo narium*, etc.

† *Observations sur la cure radicale de plusieurs polypes de la Matrice, de la Gorge, et du Nez.*

‡ "*System of Surgery*" (first edit., 1784), Am. edit. 1791, Vol. III, p. 42 seq.

§ "*Traité des Operations de Chirurgie*," 1742; "*Observations de Chirurgie*," 1731.

|| "*Chirurgical Observations*," 1775.

forceps and other evulsive methods. He believed there were many polypi which, though not malignant, should be left alone on account of the impossibility of a successful operation. He denied with scorn the efficacy of escharotics and setons. Mann, according to Cloquet*, and Petit, and according to Garengéot†, first split the soft palate for the extirpation of a post-nasal polyp.

Some account may now be given as to the ideas in regard to the etiology and pathology of the nasal polyp. A singular conception of the etiology and pathogenesis of the polyp, in præ-Schneiderian days, may be found in Forestus. In spite of the monstrous error of conception, we may perhaps recognize the germ of the idea which subsequently became the accepted one until the rise of the Myxoma mistake in the last half of the nineteenth century. Forestus, writing in the last years of the sixteenth century, mentions (l. c.) the remarkable case of a woman in whose nostrils a huge polyp had grown "due to her carrying heavy weights on her head; it forced the mucus down into the membranes of the nose." She was cured by ligation of the polyp and the application to its stump of vitriol; but when she resumed her occupation, it again returned and was again cured in the same way.

Previous to the eighteenth century nasal polypus was still a very comprehensive term, and Van Meckren‡ even gave that name to a piece of wood, covered by granulations, which was expelled from the nose of a patient he was treating by local applications§.

Passing over a hundred years from Forestus, and beyond the advent of the Schneiderian anatomy, we find the idea modified by Saint Hilaire.¶ "*The polypus*. When this excrescence is hard and is not pendent they call it sarcoma, which is a great round tumor, which has not a root like the polypus; moreover, sarcoma always commences at the lower part of the nostrils, and the polyp takes its origin in the osseous lamellæ at the root of the nose. In order to well understand the cause of this excrescence, it is necessary to observe that the internal membrane of the nose is very thick and spongy, and is bathed in a sticky viscid humor, and its

* Osphresiologye.

† "*Traité des Operations*," T. 3, p. 52 obs. V. Edit. 1731. Garengéot does not state which of several French writers before him of this name he refers to.

‡ "*Observationes Medicæ Chirurgicæ*." In *Latinum translata* ab Blasio, 1682.

§ The earliest account of a rhinolith I have noted is by Thos. Bartholinus. It is referred to by Cloquet: *Osphresiologye*.

¶ "*L'Anatomie du Corps Humain*." Par le Sieur de Saint Hilaire, 1698. Tome I, p. 439. *Des maladies du nez*.

porosities are so arranged that it only gives passage to those parts of the blood which are the thickest and most likely to produce excrescences. All these causes joined together contribute greatly to the generation of polyp. Whenever a little heat and disturbance get into the blood, its movement increases, its viscid parts are extruded, the heat fixes them and condenses them, and their abundance in a part as spongy as the nose, furnishes the substance of the polyp, because these humors becoming arrested in the tissue of this membrane, they swell its vessels and dilate its glands; the matters congeal, and are changed into a fungous and carcinomatous mass and, by the addition of new matter, the polyp enlarges and grows. The polyp indeed may also be engendered by an acrid lymph, which erodes the glands and the channels of the internal membrane of the nose in such a manner that the nutrient juice, becoming infiltrated by the ulceration of this membrane into the interstices of its fibres, coagulates there and forms, little by little, those excrescences which they call polypi. One may again attribute the cause of these excrescences to the little glands of the membrane, which, in dilating, become joined together and form that which we call polypus. The acidity of the humors may indeed contribute to the generation of these excrescences, because it can coagulate the nutrient juice, which, becoming lodged in the glands, remains there, having lost its fluidity, and new juice flowing there and coagulating, it forms a tumor in the nose, which they call a polyp."

I am sure I may be pardoned for giving room to this verbose and confused extract, because it illustrates very well indeed the new light, as yet but little appreciated, which had been shed over medicine by the discovery of the circulation of the blood and the lymph, and by the demonstration of the glands as well as by the anatomical researches of Schneider. Through it all there runs the influence of both the Iatro-chemical and the Iatro-physical school.

Although he practically adopts the classification of Hippocrates, mentioning five kinds of polypi, Dionis*, the first edition of whose surgical work was published in 1707, makes this distinction between two varieties: "One is an excrescence formed by the engorgement of the glands which line the walls of the pituitary membrane, and the other is the extension of this membrane gradually elongated." One has only to read Boerhaave and Morgagni to perceive that they also had the idea of a membrane clogged with humors. Boerhaave

* "Cours d'Operations de Chirurgie."

in his *Institutiones** could only account for the formation of a polypus, by supposing that the nasal passages and the sinuses becoming clogged with inspissated mucus, the mucous membrane was unable to discharge its humors. Popular belief in the reality of lunar influences, a lingering of primeval superstition, is reflected in the works of Juncker† in his references to this subject. He says that according as the moon fills or wanes, the polypi of the nose increase or decrease in size. "Hence it may be concluded, it is best to attack the polyp in the waning of the moon." After this, it is necessary to add that he was a respected and distinguished medical writer in his day.

Gorter‡ speaks of nasal polypus thus: "It seems sufficiently evident that the pituitary membrane is separated from the bone, often carious, in the cavity of the nostrils, so that it makes a pendulous sac, either single or multiple, according as this membrane is separated from one or more depressions of the small bones, which sacs swell with secretions collected in the cellular lamellæ of the membrane."

Heister§, the great German surgeon of the eighteenth century, adopts this pathology, and, referring to the earlier work of Palfin, who had made the same observation||, he speaks of polypi springing from the accessory sinuses and the cavities of the ethmoid.

Morgagni¶, while accepting this view, differentiates much more intelligibly than previous writers the various phases of intra-nasal disease. Referring to cases of polypi of the maxillary antrum reported by Meckren and Palfin, he says that they are much more frequently seen, at post-mortem, outside than inside the sinuses. He describes hypertrophies at the lower border of the inferior turbinated bones, which he regarded as glandular, doubtless more on account of their nodular surface than on account of histological findings, of which nothing was yet known in these cases.

We will now turn to the accessory sinuses which have, of late years, assumed a position of such striking interest in rhinology that they deserve a special notice of their anatomy, physiology and pathology. Notwithstanding that Galen refers in several

* "Boerhaave's Lectures on the Theory of Physic," being a genuine translation of his *Institutes*, 1755. Vol. IV, footnote p. 28.

† "Conspectus Chirurgiæ," 1721.

‡ "Chirurgia Repurgata," 1742.

§ "Chirurgie," 1743.

|| "A surgeon of Paris once told me he had seen a polyp which had its attachment within the cavity of the os maxillare and had grown through the hole of communication into the nose; this he had observed after death." Palfin: "Anatomie du Corps Humain," II me partie, Cap. 15, edit. 1726, p. 92.

¶ "De Sedibus et Causis Morborum."

places* to the porosity of the bones of the head making them of little weight, there is no direct reference, so far as I can discover, to the sinuses. As we have noted, Berengar described them, and he is credited with being the first to definitely indicate their existence. Vesalius† described the maxillary, frontal and sphenoidal sinuses, and asserted that they contain nothing but air. Both he and Fallopius (Institut. Anatom.), in quoting Galen, leave the impression that the latter had definitely noted the accessory sinuses. They agree with him in explaining the porosity of the bones of the head as having been created to render them less heavy. Massa, who wrote before Vesalius' work saw the light, also entertained‡ this view. We have noted that Colombo suggested the name Ampullosum for the os maxillare on account of its sinus. After Berengarius, Fallopius§ first added materially to our knowledge of the accessory sinuses. Describing the sphenoidal sinus, he says: "—there is no cavity in children until they arrive at maturity. In adults, however, it is found double and sufficiently large. It begins to form after the first year. — Those cavities, contained in the frontal and cheek bones, are not to be found in the skulls of the newly born." After criticising some erroneous opinions which certain anatomists had entertained in regard to the sphenoidal sinus, he says: "The third opinion is that they serve for holding the air before it enters the brain. This, while a more respectable opinion, becomes ridiculous in view of their absence in infancy," and he adds the sage remark, "Ex his colligo licere cuique philosophari, at non semper sine errore." In another trite Latin sentence he accepts the idea of Galen. "Nani natura, cum vult extendere et non addere materiam, inflat et faciat ut illæ partes sint leviores." Notwithstanding the fact that this ancient view is still the accepted one, so far as we at present indulge in any teleological speculations at all, there have always been numerous divergences of opinion as to the uses of these cavities. Thus Veslingius|| says: "There is much doubt as to their use. Each one forms his own conjectures. Some, as Placentinus, claim they contain mucous humor which is distilled into the nares; others that they serve to make the voice more resonant, because in those who speak badly they are not found. Some think the air is elaborated in them for

* As for instance De Usu Partium IX, 2 et seq.

† De Humani Corporis Fabrica Lib. I. Cap. VI-IX.

‡ Epist. Med. et Philosoph., 1542. Epist. V., p. 55.

§ Gabrielis Fallopii. Obs. Anatom. Frankfurt Edit., 1600, p. 367.

|| "Syntagma Anatomicum." Appendix, Pars XIX 1637.

the generation of the animal spirits. Spigelius thinks they are for drawing in the odors. Others think they contain the humor by which the eyes are moistened and lubricated." He himself accepted the view of Galen. A reference to Spigelius will show that he also regarded the sinuses as adding a sonorous quality to the voice*, and Bartholinus supported him in this†, asserting they were not present in those of a faulty voice. Both Fallopius and Veslingius, as well as Jessen (1601), supposed they were also instrumental in the generation of the animal spirit. Jessen and Bartholinus believed the frontal sinus contained a viscid liquid, which lubricated the eyeball. Paaw‡ speaks of the frontal sinus as containing a viscid matter, not dissimilar to the substance of the brain, but, "Far more likely in my opinion is the use of this cavity that of receiving the air drawn through the nostrils into it, so that it may be better assimilated and prepared for the brain. Unless it is thus properly prepared by this and other sinuses, the ingress of this crude and unprepared air causes catarrhal troubles of the brain." These opinions of more original observers are reflected in a curious book§ on anatomy published in English, evidently for popular use, by a Dr. Alexander Read, in 1642. He speaks of the frontal sinuses as double in childhood, but one in those of ripe age. "These cavities contain a clammy substance, kept in by a green membrane. They are for the retention of the odor, before it is carried into the brain." As for the sphenoidal sinus, he says, "there is a cavity like to those above the eyebrow," but he speaks of the ethmoidal as furnishing a way for the excretions of the brain. Schneider's works finally revolutionized all this. He declared that the sinuses had nothing to do with the animal spirit and were empty. The latter opinion, however, made its way very slowly. Almost a hundred years after Schneider, the great Boerhaave declared, in his lectures, not only that acuteness of smell largely depended on the size of the frontal sinus, their presence allowing a greater extent to the pituitary membrane, but he also was of the opinion that they acted as reservoirs for the nasal secretions. He remarks that the reason why children's noses are always running, is that the accessory sinuses are not sufficiently developed to contain the mucus. Much of Boerhaave's nasal pathology was based on this conception. The fluid, which the earlier anatomists supposed they contained, was

* *De Human. Corp. Fabr.*, 1645.

† *Anat. Reformat.*, 1658.

‡ *De Human. Corp. Ossibus.*, 1633.

§ "The Manual of Anatomy, or Dissection of the Body of Man."

thought to have come from the brain. After the publication of Schneider's works, Diemerbroek still believed, as has been stated, that it came from the brain, but through the mucosa which lines the nose and its cavities, thus keeping the latter full. Vieussens (born 1641) supposed they contained a thick fluid, filtered out of the blood on its way to the brain. Much later the great Haller* in the eighteenth century accepted this view, intimating they were reservoirs for lubricating the nasal mucosa. Verheyen (1648-1710) had, however, previously asserted they were empty. Reininger partook of the view of Haller, saying the sinuses were so arranged as to the nasal cavity that whatever position we are in, their contents will drain out of one or more of them, collecting in the others, until they in their turn are emptied by a change of position. Morgagni† declared the maxillary sinus was occasionally absent. Weinhold (1783-1829) thought the sinuses were cavities, which suck the impurities out of the blood and hold them, and that they are to be regarded as the equalizing apparatus, the "equatorial bearers" of the arterial system throughout the animal kingdom.‡ The frequency with which the accessory sinuses have lately been found, post-mortem, to contain sero or muco-purulent fluid, satisfactorily accounts for this divergence of views. A more palpable error was committed by Spigelius, Bauhinus, Laurentius, Paaw and many others in supposing that the sinuses are lined by a green membrane. It was pointed out by Schneider that this condition was entirely due to post-mortem changes.

Early surgeons were familiar with the wounds, but not with the diseases of the frontal sinus. Hence we find at first no reference to the intentional opening of it, but evidently it was occasionally inadvertently included in the field of operation in trephining for cranial fractures. Ambroise Paré§, speaking of the wounds of the head, warned against trephining the frontal sinuses, as they are "filled with white sticky fluid as well as with air." Elsewhere|| he says that he had seen a surgeon trephine the sinus, in wounds of it, under the impression the brain was injured. "Wherefore it is necessary for the surgeon to become acquainted with this cavity, which he can do by breaking open several heads of the dead."

Fabricius Hildanus (l. c.) speaks of wounds of the frontal sinuses

Wounds of the
Accessory
Nasal
Sinuses.

* *Elementa Physiologiæ Corporis Humani*. T. V.. P. 180, Liber XIV—V.

† *Adv. Anatom.* I, p. 38—VI. p. 116.

‡ The incompleteness in the references, to be here noted, may be supplied by referring to the much more exhaustive history given by Zuckerhandl, *Normale und Pathologische Anatomie der Nasenhöhle* Bd. I, 1893, S. I.

§ "Chirurgie," Livre X, Chap. 21, Edit. 1564.

|| Livre V, Chap. 4.

"not healing easily and often degenerating into fistulæ and malignant ulcers." "The wounds of these cavities have such a large communication with the eyes, that I have seen acrid and corrupted pus, which flows from these cavities, fall upon the conjunctiva and push the eye out of place." Verheyen* says that he was once present at an operation on a sheep, for the removal of worms from the frontal sinus. but the animal died because the operation was too extensive. Palfin had seen the same mistake as Paré, and his differential points to distinguish the frontal sinus from the cerebral cavity in wounds of the head were: 1. "When one sees mucus coming out of the wound. 2. When air is blown from the wound by expiratory effort with closed mouth and nose. 3. The penetration of injected bitter water from the wound to the throat, or 4. Its discharge from the nose." He relates several interesting cases where this mistake was made.

Worms in the
Accessory
Nasal
Sinuses.

The remark of Verheyen, in regard to worms in the frontal sinus of a sheep, finds a precedent in human pathology in the observation of Beniveni, published as early as 1507†. He relates the case of a friend of his by the name of Phillip, who suffered atrociously with such pain in the head that his eyes grew dim, his mind wandered, vomiting occurred, the voice was lost, the body was cold and even life itself seemed lacking, but when death really seemed imminent and there seemed no help, he suddenly passed from his right nostril a worm as long as a palm's breadth, and of a most robust nature, and all his anguish was relieved.

Morgagni,‡ referring to Littré as having, in 1704, conceived the idea of trephining the frontal sinuses, says that Mangetus, according to Vallisnieri, had performed the operation for the removal of a worm whose presence he had diagnosticated as giving the patient great pain. According to Cloquet,§ Vallisnieri was the first who spoke of worms in sheep's noses from the true standpoint, but Morgagni, speaking of worms being frequently found in sheep's noses and rarely in man's, credits Fernelius|| with having first declared that the brain was not the origin of worms in the nose. This subject of worms in the nose was exhaustively discussed in the first part of the eighteenth century by Salzmann and Honold.¶

* Quoted by Palfin: "Anatomie Chirurgicale," part II, p. 93, Edit. 1726.

† Antonii Benivenii, de abditis nunnallis ac mirandis morborum et sanationum causis. 1507.

‡ De Sedibus et Causis Morborum Liber I. De Morbis Capitis, Epist. Anatom. Med. XIV sec. 20 et seq. 1762.

§ "Oosphresiology," p. 617.

|| Fernelius, born in 1497, died 1538, was the physician who cured the beautiful but frail Diana, of Poitiers, and is said to have been the first, since the time of Al-Mamum, the Arab, (876-833), to calculate the circumference of the globe.

¶ De Verme Naribus Excusso, in Haller's "Disputat. ad Mobr. Hist.," I, 385, 1721.

The following is from Boerhaave's "Institutiones" No. 792:

"There was a distressing example of a girl at Rotterdam, whose six pituitary sinuses were all full of worms, which kept on growing and appeared from hour to hour; and this girl I cured by a slight fumigation with cinnabar and a decoction of tobacco in water which, being snuffed up the nose, obliged the worms to move their quarters."

Perhaps the earliest reference to what may have been sinus suppuration is to be found again in Fernelius: "There forms sometimes abscesses around these places without fever or very much pain, and after their rupture I have seen true pus run in abundance from the nostrils, as it comes out of purulent ears, and this without any prejudice to the general health." Morgagni (l. c.), from whom I have quoted this extract, comments on it, saying that doubtless Fernelius was referring to the accessory sinuses, "for how could a man like him suppose the pus came from the anterior cavities of the brain?" One might answer, that without the anatomical knowledge supplied by Schneider 100 years later, it would have been strange if Fernelius thought of the pus or the worms either, as having come from any place but the brain. One is therefore not surprised on turning to the passage,* evidently referred to by Morgagni, to find no warrant for supposing that Fernelius suspected the true origin of the pus or the worms. His work appeared first in 1567.

Nathaniel Highmore, in 1651, described† the sinus, which bears his name, and gave some poor representations of it. He, however, mentions a case of suppurative disease of the cavity in a woman who had some bad teeth in the upper jaw. This was before the publication of Schneider's work, though, as we have seen, the sinuses had long been well known.

Surgery of the
Maxillary
Sinus.

Velpeau‡ quotes Molinetti, who wrote in 1675: "In a patient suffering from terrible pain, they made a (external) crucial incision on the jaw, and with the crown of the trephine penetrated into the antrum of Highmore, which was the seat of the abscess."

Morgagni intimates that Jean Henry Meibomius, who died in 1655, invented what we now know as Cowper's operation for opening the maxillary antrum, and his son practiced it. Velpeau says that Zwinger, before Meibomius, pulled out teeth and, dilating the alveoli with a sponge, made exit for pus from the antrum. There

* Johanni Fernelii Ambiani, "de Morbis Universalibus et Particularibus," Edit. 1656 Lib. V Cap. VII.

† Corporis Humani Disquisitio, 1651.

Nouveaux "Elements de Medecine Operatoire," 1839, VII, p. 608.

were three medical authors by the name of Meibomius, apparently different generations, but their works, as well as that of Zwingler, are inaccessible to me. William Cowper contributed the chapter on the diseases of the nose to Dr. Drake's "*Anthropologia Nova*," which was published first in 1717, and there* is to be found the description of the operation as we know it.† " * * * By all which, it appears with what difficulty any peccant humor, lodged in either of these cavities, can be discharged by the foramina narium, since these cavities must be either filled up to the top ready to run over first, or the head must be held down to procure the discharge. This induced me to put into practice an operation, in the cure of ozena, which appeared reasonable to me by the structure of the part, I being convinced it might be done without hazard to the patient. After the foremost Dens Molaris was taken out, not finding an aperture from its alveolus into the antrum, which in other instances I have seen happen, with a convenient instrument I bored the hole of the alveolus into the Antrum Genæ, whereby the pus, which before lay in the antrum, ran out, and the medicines that were daily injected by this aperture passed into the nostrils, whereby the patient was cured, though this disease had continued, with a vast flux of stinking matter daily from the nose, for more than four years before the operation." Besides another case operated on in the same way, he relates the history of an old man in whom the maxillary antrum was opened. Carious bone came away with the teeth, when extracted, and the man soon died from convulsive disorders, when, on post mortem, a fistulous tract was found through the Foramen Lacerum; the opposite side of the os sphenoides was also perforated and the dura-mater laid bare but not perforated; but on the contrary it was inflamed, and very much thickened on that side of the head: "I found an apothemation in the cortical substance of the fore part of the hinder lobe of the brain, though covered with the pia mater, in which was about an ounce of fetid matter." He also first suggested the perforation of the antrum on its anterior surface. According to Portal‡, Lamorier, a surgeon of Montpellier, born in 1717, proposed, as the result of his own investigations, to open the sinus more posteriorly, between the malar tuberosity and the third molar tooth. Jourdain, a Paris dentist, in 1765 reported to the Royal Academy of Surgery of Paris a method of washing out

* Vol. III, Cap. 10, p. 305, Edit. 1717.

† From the spelling which is usually employed (Cooper) doubtless many have attributed this operation to Sir Astley Cooper, who lived a hundred years later.

‡ See Velpeau, l. c., who gives a very exhaustive account of the earlier literature, but unfortunately without exact references.

the Antrum of Highmore through the natural opening.* He also is credited with the observation, which of late has again been brought into prominence, that fetid matter is often found in the maxillary sinus of those who had succumbed to adynamic or ataxic fevers. For opening the sinus Desault used a sharp triangular perforator, Runge used a knife, and Chas. Bell a trephine. I further translate from Velpeau the following: "In a patient, who had no longer any molar teeth, the idea occurred to Gooch† to perforate the Antrum of Highmore from its nasal surface. This method was also proposed by John Hunter in his treatise on the human teeth in 1778. Ol. Acrel‡ had already followed an almost similar procedure, that is to say, after operating in the manner of Cowper he placed a second canula through the nose into the sinus. * * * A buccal fistula of the maxillary sinus suggested to Ruffel§ the idea of penetrating there with a perforator, making it come out above the gum in order to establish a counter opening. A seton was then passed and kept in the opening for six weeks, working so well that success crowned the efforts of the surgeon. Callisen (1740-1824) followed this plan. * * * Bausch and Henkel succeeded by passing a seton through a fistula in the floor of the orbit and bringing it into the mouth through an alveolus. Bertrandi resorted to a like plan, not, however, using the seton. Weinhold (1810?) went through from the upper part of the canine fossa into the antrum and thence through into the palatine vault. Jussi operated in much the same way."

On reference to Callisen's work|| I find that he refers to abscesses of the frontal and maxillary sinuses. He advised operation by trephine on the former, and perforation through the canine fossa in the latter. He advises that the opening should be kept pervious by a linen tent, or a sponge, or a tube made of elastic resin, (*resinæ elasticæ*—rubber?) or of gold, so arranged that it will not slip into the cavity. He declared that penetration through the hiatus-semilunaris, as recommended by Jourdain, is often impossible. He was also familiar with polypi in the Antrum of Highmore. I am sure any one, reading these accounts of operations on the Antrum of Highmore for suppurative disease, will perceive that all the recent procedures, which have been of late so exhaustively and frequently described, have been long anti-

* "Journ. de Med. Chir. Pharm.," etc., Paris, 1767, XXVII,—52,—157

† An English surgeon who died in 1780.

‡ A Swedish surgeon born in 1707 and died at 90 years of age.

§ I can find no other reference to a physician of his name.

|| "Systema Chirurgiæ Hodiernæ," Vol. I, p. 343, et seq., 1798.

pated in surgery. Tumors of the maxillary sinus we have noted as having been reported by Palfin and others. Van Ruysch reported finding two at post-mortem.* In the *Journal de Desault* in 1791 is an account of an operation of considerable gravity by Plaignand in 1784 on a tumor of the maxillary antrum which was successful.† Another case is reported‡, in which the disease was allowed to pursue its course unmolested, and the patient died three years after its inception.

It remains to say something in regard to diseases of the tonsils during the period with which we have been dealing. Very little advance is here to be noted. Beside the hypertrophy, disease of the tonsillar structure is rarely alluded to independently of acute throat inflammations. Sydenham incidentally made the singular remark, but doubtless well founded, that red-haired people were more liable to tonsillar inflammation than others. Ettmüller,§ in his remarks on inflammation of the tonsil, draws attention to the gaping of the foramina. "On account of this," says he, "when these tonsils are swollen and more or less inflamed these foramina gape and are more conspicuous, so that they are taken for ulcers by the inexperienced surgeons." Fallopius had also drawn attention to this point, still frequently the source of error.

As to operations on the tonsils, coming down as late as the middle of the eighteenth century, we find surgeons still, as ever, with a wholesome respect for tonsillar hemorrhage. Heister's category (1. c.) of operations on the tonsils is: 1. Corrosive applications. 2. Abscission according to the methods of the Ancients. 3. Ligation, using the apparatus of Hildanus for the uvula. Cheselden, he says, applied such a ligature by means of a sound. Benjamin Bell (1. c.) employed his double canula snare for ligation of the tonsils, in the same manner as for nasal polypi. A method, which he also ascribes to Cheselden, was to pierce the tonsil with a double threaded needle, and tie off each half of the tonsil in a ligature. Even such a radical operator as Desault||, although he performed tonsillotomy with an instrument he called Kiotom (Uvulotome), yet in pusillanimous patients he used a ligature put on with a forceps, and tightened for a day or two until the tonsil fell off.

* Frederici Ruyschi Opera Omnia Obs. LXXVII, Vol. I, p. 71, Ed. 1737.

† T. I., p III.

‡ Ibid. T. II, p. 278.

§ Opera Omnia. 1686.

|| "Œuvres Chirurgicales, Vol. II. Edited by Bichat.

In the eighteenth century but few advances are to be noted in the gross anatomy of the nose and throat when compared to the much greater strides made in the sixteenth. Still there were some. We have already noted the description of the pharyngeal tonsil by Santorini. He first described the cartilages in the larynx which have taken his name, declaring they are found in man but not in animals. He drew attention to the great mobility of the crico-arytenoid joint, and gave the first intelligent account of intralaryngeal movements.*

Bertin described the sphenoidal turbinated bones.† Meckel and Ackerman and Daniel wrote learned and valuable treatises on the nervous system of the nose and throat.‡ Valsalva had written his great work on the ear§ which was first published in 1705, and described more accurately the palatal muscles, but not his least claim to fame in the annals of medicine is the fact that he was the preceptor of Morgagni, and started him upon that series of observations at the post-mortem table, which has resulted in the firm basis modern medicine now has in pathological anatomy. The predecessors of Morgagni were too much occupied with rare cases and fabulous histories, the curiosities of Medicine, to make much advance in this direction. Post-mortem examinations were not infrequently made in the seventeenth century, and even in the sixteenth century. Thus we find Tulpus, who rivaled Bontekoe in his devotion to tea and tobacco as panaceas, describing|| a malignant tumor of the pharynx and œsophagus observed during life and examined post-mortem. Incidentally in many epistles of Thomas Bartholinus and of many others there are scattered accounts of the study of lesions found post-mortem. Bonet is the first who systematically recorded¶ the history of cases and the results of observations on opening the body after death, but his work is a most verbose, unclassified, and entirely unreadable record of much which might in other hands have been valuable. In it we find the confirmation of Schneider's observations, but in his zeal to prove that the blood vessels carry the nasal discharges, he exaggerates and distorts the significance of anatomical facts. He taught that the mucus was derived from the blood and lymph vessels of the glandular mucosa, and that in

* *Observationes Anatomicæ*. 1724, *De Larynge*.

† *Description de deux os inconnus*, par M. Bertin, *Mem. de L'Académie des Sciences*, 1744. p. 298.

‡ *Ref: Sprengel*, VI, 162.

§ *Valsalvæ Opera*. 1742 *Auris Descriptio*. Cap. II, XIX.

|| *Observationes Medicæ*, 1641, Lib. I, Cap. 44.

¶ *Sepulchretum* first edit. 1679, another and enlarged edition by Mangetus in 1700.

the brain they absorbed and carried away its secretions. Nevertheless, he opened the way for the observations of Valsalva and his great pupil, Morgagni. It may be remarked that the latter refers to Bonet as having reported some cases of laryngeal tumour observed post-mortem, but I have been unable to find the reference.

Morgagni.

Although the immortal "De Sedibus et Causis Morborum" was not published in its entirety until 1762, when Morgagni was nearly eighty years old, his "Adversaria Anatomica" was published when he was a young man (1706-1723). A few points of interest to us may be found in it. He was somewhat influenced by Van Ruysch* in his description of the nasal glands. The tracheal glands first mentioned by Laurentius he describes more fully.† He speaks also of the laryngeal glands‡ and made the singular mistake, on noting the cuneiform cartilages, of describing them as glands. This mistake many years later was corrected by Wrisberg,§ whose name they now bear. Morgagni passes in review the anatomical facts brought to light by early anatomists as to the cartilaginous framework of the larynx.|| Galen first noted and described the ventricles of the larynx, giving them that designation, but Morgagni's name has been attached to them on account of his more elaborate description.¶ He also described the Appendices Laryngis Ventriculorum.** He supposed that the ventricles are instrumental in modifying the voice, but he warned against the reasoning from animals like the frog to man, various authors having explained their function in this way. Nevertheless, he thinks this more probable than that they form reservoirs for mucus to lubricate the cords. He ascribes this opinion to Verheyen. He points out that the surrounding mucosa is quite as well supplied with glands as are the ventricles.

Deviations
and Spurs
of the Nasal
Septum.

When we turn to his more celebrated work we find that the first subject which engages our attention in the chapter which he devotes to the nose and ear is that of deviation of the septum††. Quelmalz‡‡

* Advers. Anatom. VI, Animad., 89,

† l. c. I., 25.

‡ l. c. V., 42.

§ In the notes to Haller's *Primæ Linæ Physiologicæ* edited by Wrisberg, this error was pointed out in 1780.

|| l. c. I., 23.

¶ l. c. I., 16.

** l. c. V., 42, V. 43.

†† The *De Sedibus et Causis Morborum* has been carefully translated into French by Desormeaux et Desnouet, and some readers will find it more convenient to consult this ten volume edition than the original Latin work. The same references apply to that. See "Des Maladies des Oreilles et du Nez" No. 16 Tome II., p. 343 et seq. Edit., 1820.

‡‡ *Programma de Narium earumque Septi Incurvatione*. Haller's *Disputat. ad Morborum Historiam*, 1757. T. I., p. 377.

had in 1750 written a treatise on this subject, the first, so far as I know, of its kind. It is still a readable thesis, in which much which is discussed in modern rhinological literature may be found intelligently set forth. Among the causes of the conditions he mentions, are pressure on the nose in difficult labor, falls in infancy, the continual thrusting of the finger into the nose in childhood, inflammatory conditions, and others, which we do not now regard as efficient. He speaks intelligibly of the symptoms and the sequelæ, but says nothing of the treatment. Morgagni, criticizing him for not mentioning exuberant growth of the cartilage, speaks of often finding this condition on post-mortem dissection. Deviation of the septum, he declares, is often natural, and he warns observers against being deceived by those who write in an absolute manner that the nose is divided into large equal cavities by an intermediate septum. On the other hand, "To this error another is opposed by those who say the septum is always inclined to one side or the other, except in children." He had seen in adults many straight septa. Then follows the explanation of the cause of deviated septa which still holds good after 150 years: "The too rapid growth of the septum relative to the other bones of the upper jaw, from which reason there necessarily results a curvature." He also described very carefully a septal spur without deviation in an old woman. I have already had occasion to refer to Morgagni's views on nasal polypi and his notice of hypertrophies of the inferior turbinated bone, which he regarded as glandular.

Bidloo* had described a case in which cerebro-spinal fluid had escaped from the nose as a result of injury. St. Clair Thomson† has quoted another case, reported previous to this by Willis‡ whose nervous fluid theory Bidloo earnestly combatted. Morgagni§ had also seen such a case. He was also aware of the existence of what was afterwards known as Jacobsons' organ, which had been noted by Steno and Van Ruysch.

I will reserve Morgagni's important observations on laryngeal ulceration until I have occasion to trace the history of laryngeal phthisis, introducing here, however, his notice of slight irritation in the auditory canal as a cause for persistent cough.||

Lieutaud was the follower of Morgagni, and recorded many in-

The Cerebro-
Spinal Fluid.

* "Exercitat. Anat. Chirurg. Decas," 2, 7, 1703.

† The Cerebro-Spinal Fluid, 1899.

‡ Cerebri Anatome.

§ L. c. No. 21. He apparently did not recognize it as of cerebral origin.

|| L. c., XIX, 54.

teresting observations made at the post-mortem table, but his work is really nothing more than a note-book, unclassified for the most part, and without any deductive instruction. Besides laryngeal and tracheal polypi and ulceration of the larynx, we find* this remark on the pathological conditions in the air passages of a girl evidently dead of diphtheria: "Glottidi hærebat materia quædem mucosa. Interior trachææ facies crusta viscida purulenta investiebatur," etc. There are records of other cases of a like nature. He observed pus in the frontal and occipital (sic) sinuses.†

THE NINETEENTH CENTURY—THE PRAE-LARYNGOSCOPIC ERA.

I do not know how I can better usher in our story of a new epoch, than by going back into the Eighteenth century to pick up the thread of the ideas which have dominated the latter part of the Nineteenth. This I shall frequently have to do in matters more immediately cognate with our subject.

In 1779 Vicq D'Azir,‡ announced, before the Academy of Science in Paris, that he had been able to trace the intermaxillary bone in the human foetus, and he had Darwinism in his mind when he made the reflection that Nature seems always to model her works after a primitive ideal.

The Intermaxillary Bone in Man.

In 1784 Goethe wrote to his friend Herder: "I have found neither gold nor silver, but that which gives me an inexpressible delight, the os intermaxillare in man." This had been, apparently by an accidental blunder, as we have seen, described by Galen and depicted by many of the anatomists of the Renaissance. This had been, if we may be allowed the expression, a bone of contention for many centuries. The fact that man was supposed to have no intermaxillary bone was one of the arguments by which he was distinguished from the brutes, but Goethe believed in the unity of nature, and six years later he wrote his "Metamorphose der Pflanzen," in which is contained the philosophy of Spencer and the biology of Darwin.

And now we must plunge at once into the medical history of the Nineteenth century, returning, as I have said, many times to pick up the threads of our story amidst the records of past ages.

It is still impossible to comprehend the historical significance of the phenomena of the Nineteenth century just passed. We are just leav-

* "Hist. Anatom. Med.," 1767, Tom. I, p. 435.

† "Tom.," II, p. 292.

‡ Oeuvres de Vicq D'Azir, T. IV, p. 159.

ing it behind, and its proximity in the historical landscape gives us no opportunity for philosophical perspective, while the lifeless chronicle of events is a dreary work which is to be avoided if possible.

The French Revolution, the great cataclysm which finally and irrevocably burst asunder the bands of ecclesiastical and political tyranny, horrible and frightful as was the catastrophe and its immediate results, was the denouement of that series of events to which the Renaissance was the prelude in the history of Civilization. In the Sciences, and especially in Medicine, the beginning of the fruition of this enfranchisement of thought, of speech and action did not become apparent until near the middle of the century just passed. Coincident with the social and political upheaval in France appeared the genius which shaped the beginning of the new life in Medicine as radically as did Napoleon those events, the chronicling of which is called History.

Bichat.

Bichat was the first to turn the torrent of eager study and investigation of biological secrets toward the elucidation of the physiology and pathology of the separate tissues, as distinguished from the anatomical localities and organs of the animal body. Before Bichat, since the time of the Arabs, diseases were divided according to their situation, the head, the chest, the stomach. Morgagni first classified disease according to the lesions of the different organs of the body. Bichat, continuing the differentiation, described the different tissues of which the various organs were made up.

Since the revolt of Cullen and his predecessors from the old humoral pathology, we have been practically upon a basis of the Solidism which he had carried to such extremes. It is only within the last few decades that we have begun to perceive that all such divisions are impossible, all regions, all organs, all tissues, all of the body fluids are too intimately associated one with the other, to allow us to single out, in disease, any single unit as the entity exclusively deranged; but we may note a tendency in the recent trend of research in the problems of immunity for the pendulum to swing back again, after nearly two hundred years, to the domains of humoral physiology and pathology.

Bichat sketched the outlines of the study of physiology and pathology which were later filled out by the labors of the Germans, the schools of Johann Müller and of Virchow.

In his "Anatomie Pathologique" he considered the functions and the morbid states of the serous and of the pituitary membranes, but he insisted* that not only should pathology be studied from the

* Anatomie Pathologique. Dernier Cours de Xavier Bichat d'après un Manuserit Autographe de P. A. Beclard—1825.

standpoint of the system of tissues affected, but from that of the character of the lesion as well. It is true, here as always, that this thought had existed in the minds of many before Bichat, but it was left to him to inaugurate its practical application. He, himself, had little opportunity in his short life to even begin the Herculean task of filling out this comprehensive schedule. He died when just turned thirty.

Special Treat-
ises.

Before reviewing the comparatively few steps in advance taken in the knowledge of our subject during the prae-laryngoscopic era of the Nineteenth century, some reference must be made to special treatises.

Olfaction.

In the early part of the century considerable attention was devoted to the nose as the organ of olfaction. Indeed, since the decline of the Galenic physiology and the establishment of the doctrines of Schneider, the fact had often been lost sight of altogether that the nostrils were an essential part of the respiratory tract. When it became evident that the air did not ascend to the brain, and the secretions of the latter did not drip downward in catarrh, the warming, dust freeing, moistening functions of the nose in respiration, upon which Galen laid the proper stress, sank from view and have only again been brought into prominence within the last two decades. We have seen that the mistaken idea of some of the early anatomists, as to the olfactory function of the accessory sinuses, long lingered after the error had been pointed out that they prepared the air for the brain. This idea of the nose solely as the organ of smell probably led to the prompt acceptance of the organ of Jacobson as an occasional diverticulum in the mucosa serving for olfaction. The great Cuvier laid the Danish anatomist's communication* before the Institute of Paris in 1811. Ruysch†, in 1703, pictured the orifice in the nose of an infant he had dissected. Morgagni‡ refers to Steno as having noted this organ in a sheep. He seemed to connect it in some way with cases, which Thomson (l. c.) rightly regards as instances of the escape of the cerebro spinal fluid from the nose. Sommering also noted it before Jacobson's paper.§

Jacobson's Or-
gan.

Deschamps.

Deschamps in 1804 published the first separate "Treatise on the Diseases of the Nasal Fossae and Their Sinuses." Naturally prominence was given to the physiology and pathology of olfaction, and

* Descriptive Anat. d'un organ observe 'dans les Mammifères. Ann. de l'Inst. d'Hist. Nat. XVIII. 1811, p. 412-24.

† Ruysch: Thesaur. Anat. III. Tab. IV, fig. 5, A Edit. 1744.

‡ Morgagni: De sedibus et Causis Morborum. Lib. I. De Morbis Capitis 21.

§ For further information as to the history of the organ see "Nasenhohle und Jacobsonsches Organ," Mihalkovics, 1898.

Deschamps declared that the filaments of the olfactory nerve may easily be traced to the middle of the nasal fossae, but he denied absolutely, as a result of experimentation, that the sinuses contribute anything toward the function of olfaction. This had been previously less emphatically asserted by Richeraud.* Notwithstanding these positive statements, such an eminent authority as Majendie in 1817 inclined to the opposite opinion. He says: "The larger size of the sinuses seems to coincide with a greater power of olfaction; this at least is one of the most positive results of comparative anatomy." He, however, admitted that the olfactory filaments had never been followed into the sinuses nor found in the mucosa of the inferior turbinated bone, nor on the inner surface of the middle.

Deschamps's work of more than 300 pages is one of considerable interest, not only because it was the first separate book on Rhinology, but because it may be supposed to represent fairly well the state of knowledge at the beginning of the century as to intranasal disease. He says nothing whatever of anterior rhinoscopy, nor of a nasal speculum, though, as we have seen, traces of both had from time to time appeared in medical annals. Notwithstanding this most important, and other scarcely less noticeable omissions, he professed to include all the matter of interest known to medicine in regard to the nasal fossae and their annexa in his book. He distinguished the ordinary tumefaction of the mucosa from the nasal polyp, and for the former he recommended the use of oiled bougies in dilating the obstructed channels of the nose. He divided nasal polypi into (1) fungous and vascular. (2) Mucous and lymphatic. (3) Scirrhus. (4) Sarcomatous. His methods of treatment were, (1) The local application of astringents. (2) Excision with a guarded bistouri. (3) Avulsion with the forceps, to which he devotes considerable space. (4) The knotted thread he speaks of with ridicule. (5) Chemical caustics, nitrate of silver—"mercurial water" (Acid nitrate?)—butter of liquid antimony, and the actual cautery. (6) Ligature with a waxed thread and with wire of pure silver

These methods of operating he adapted to his different varieties of polypi, giving preference to the ligature. The wire loop adjusted with forceps and finger was, when in situ, tightened by pulling it through the eye of a probe or sound. The polyp was removed more by avulsion than by abscission. For ozoena, he recommended the application of the cautery when "the site of the ozoena permits;"

* *Nouveaux Elements de Physiologie*. Vol. II, p. 57, 1802.

otherwise he abandoned the treatment of this disease to palliative measures. He confused essential ozoena with the syphilitic. Considerable space in this book is devoted to the consideration of sinus disease, principally of the maxillary antrum, but he recognized the painful symptoms of acute catarrhal inflammation of the frontal sinus. He speaks of simple inflammation of the maxillary sinus, also of polypous tumors, and of dropsy of that cavity. He counsels opening the maxillary sinus, in suppurative disease, through an alveolus of a bad tooth if it exists; otherwise to make an opening above the alveolar border, in either case, large enough to introduce the finger. He advised an even larger opening where there were antral polypi. He has nothing to say of ecchondroses or deviations of the nasal septum.

Cloquet.

A very much more comprehensive work, especially in historical matters, was the work of Cloquet,* which was first published in 1821. It professes to be a work on olfaction, but as a matter of fact it is much more than that. Its 750 pages exhibit the enormous erudition of the author, who deals with his subject in the most exhaustive manner and from every point of view. It is an inexhaustible source, from which one may draw accounts of all sorts of phenomena related to the sense of smell. Not only is this its prominent characteristic, but it deals incidentally, much more fully than Deschamps' book, with the nose and its diseases. Membranous occlusions of the nostrils, fractures of the nose, deviations of the septum which he considered to be usually irremediable, rhinoplasty, are all more or less thoroughly discussed. Coryza, vasomotor rhinitis, rhinorrhœa, and syphilitic rhinitis with other affections are treated together, and not sufficiently differentiated to satisfy the modern reader. The same may be said of other chapters in the book. Thickenings of the nasal mucosa are considered in a page and a half.

Watt.

These works of Deschamps and Cloquet were not illustrated, but we may note in England the appearance in 1809 of the "Anatomico-Chirurgical Views of the Nose, Mouth, Larynx and Fauces" by John James Watt. It contains some colored charts of the parts with an anatomical description of them. They compare not unfavorably as to accuracy, but are perhaps not so artistic as the later color plates which have been issued so frequently lately. They are the first colored plates with which I am familiar showing the anatomy of the nose and throat.

Porter.

A few separate treatises appeared in the prae-laryngoscopic period on the larynx. In 1826 William Henry Porter published a small

* *Osphresiology*.

brochure in which he discussed croup, diphtheritis, œdematous laryngitis, phthisis laryngea, which he, like others, confused with syphilis of the air tubes, speaking at some length of the "mortification of the laryngeal cartilages." Traumatic laryngitis, foreign bodies and wounds are also discussed.* It is not accurate, therefore, to regard Albers' work as the first special work on the larynx.

Albers.

It appeared in 1829†. As Heyman has pointed out, it is a work of considerable value in that it collected what was known on the subject, but it is by no means exhaustive in that respect, and there is very little original matter in it. Of more value are the chapters he devotes to the subject in his later publications.‡ In his Atlas there are some striking drawings of laryngeal tumors. In other respects the works of Albers are noteworthy as almost the beginning of those publications on pathological subjects, which were soon to make the medical schools of Germany famous. In 1838 appeared the works of Ryland§ and of Columbat.|| Ryland speaks of croup as affecting children and the Diphtheria of Bretonneau as affecting adults. He refers also to spasmodic croup and hysterical spasm of the glottis, cases having been reported by Albers, Sir Charles Bell and Porter. Tumors of the larynx and tracheotomy occupy considerable space in his book. Columbat invented a clumsy instrument for opening the mouth and depressing the tongue, which he called a stomatoscope, also some devices of inferior interest for cutting the tonsils and the uvula.

Ryland and
Columbat.

A very much more interesting work, and one evincing more original though frequently erroneous ideas, is the one by Piorry published in 1844.¶ He opens his work with the remark that the diseases of the nose are unfortunately usually not considered in treatises on diseases of the respiratory system, and he insists on the doctrine, which received no help even from the advent of laryngoscopy, that not only many diseases of the larynx but also of the lungs depend upon morbid conditions of the nasal passages, nasal obstruction, called by him *rhinostenoma*, one of the forms of which we

Piorry.

* I am only familiar with the second edition published in 1837. Holmes speaks of the first edition as too limited in scope to be compared with the treatise of Albers, which appeared in 1829. However that may be, it is the first separate treatise on the larynx since the little work of Codronicus two and a half centuries earlier.

† Die Pathologie und Therapie der Kehlkopfkrankheiten. Leipzig, 1829.

‡ Beobachtungen a. d. Gebiet. der Path. 1836. Atlas der Path. Anat. 2te Abth. 1842.

§ A Treatise on the Diseases and Injuries of the Larynx and Trachea, by Frederick Ryland.

|| Traité des Maladies et de la Hygiène de la Voix.

¶ Ueber die Krankheiten der Luftwege, von A. Piorry. It seems to have been written but never published in French, the German edition being the only one I have found noted.

recognize in a deviated septum, the other being alternating vaso-motor stenosis. He proposed percussion, then a young science, for investigating the accessory sinuses. He described with considerable accuracy many of the sequelae of nasal obstruction and mouth breathing, including aural symptoms from closure of the Eustachian tube, and pulmonary changes, such as chronic dyspnoea and asthmatic attacks. He referred the cause of nasal disease to systemic affections. Crusts in the nose are to be removed after soaking in oil. He advised the introduction of bougies even in acute attacks. He described the dilatation of the alae nasi with a forceps to allow the light to fall in, but admitted that it was impossible to see very far by this means. Stethoscopy was also recommended by him in the diagnosis of intranasal conditions. He described rhinitis attending cases of the grip, which was prevalent in the first half of the century. On the whole this book exhibits a surprising amount of information in regard to intranasal conditions at an epoch when anterior rhinoscopy was feebly developed, and posterior rhinoscopy was unknown. Some of his ideas have not received the sanction of modern rhinology, but may not on that account be the less true. He declared that one of the causes of rhinitis was the cutting of the vibrissæ in the vestibule of the nose which should filter the dust particle from the air. He asserted that water was injurious to the whole upper respiratory tract with the exception of the naso-pharynx, and syringing either the ear or the nose, especially with cold water, resulted in inflammation. Rhinitis thus frequently arose from bathing and diving. As treatment he urged the injection of oily or fatty substances in the nose. To such extremes did he go in this direction that he advised the anointing of the nostrils with oil while shaving or washing the face. The intranasal syringing of water he condemned very strongly except for the purpose of removing foul, stinking secretions. Nitrate of silver and various powders he recommended as medicaments for internal applications. His other therapeutic measures were of a general nature, in accordance with his views of etiology. Blisters, bleeding, purging, sweating, were the vigorous measures which were recommended for rhinitis, in keeping with the heroic treatment of his times. He confused ozoena with purulent disease of the accessory cavities. For intranasal operative procedures he refers the reader to the general works on surgery. His remarks upon affections of the larynx, trachea and bronchi, as one must expect in prae-laryngoscopic times, are confusing and of little value.

Nasal Bougies.

Evil Effects of
Water on the
Nasal Mu-
cosa.

In the first half of the 19th century, began again the custom of Systems. including in one work, or in a continuous series, all the medical lore known to mankind, but instead of such a work being attempted by one author it was divided among several. In these early Systems and Handbuchs and Traités, the chapters on the nose and throat are lacking, or treated in the most cursory and incomplete manner. As an example of this sort of literature one may be cited wherein the following was published, just three years before Garcia announced the event, which at once shed a new light on diseases of the larynx.

Friedrich * says: "Unfortunately the methods of physical diagnosis do not allow, in diseases of the larynx and trachea, that extended application they do in diseases of the deeper parts of the respiratory organ."

Laennec's "Traité de l'Auscultation Mediate" in 1819, his invention of the stethoscope, and the rapid development of the other methods of the physical diagnosis of the diseases of the chest, doubtless did their part in stimulating interest and curiosity, which finally culminated in the application of inspection to the diagnosis of intralaryngeal lesions.

We have noted Piorry attempting to apply Laennec's methods to diseases of the nose, and we find Friedrich attempting to explore laryngeal phenomena by means of palpation, auscultation and inspection of the epiglottis through the mouth. In Friedrich's chapters we find intelligent attempts at differentiating tubercular from syphilitic diseases of the larynx, but œdema of the glottis and perichondritis laryngea are for him, as for many later writers, still pathological entities. He speaks of paralysis of the glottis with aphonia as paraplegias, but of course he had no means of establishing a diagnosis except from rational symptoms.

Auscultation
and Percus-
sion of the
Nose and
Throat.

To return now to the individual topics of interest in the development of our laryngological and rhinological knowledge, we may begin again with Bichat.

In the few notes which remain to us from the works of Bichat upon the histology of the diseases of the pituitary membranes, he cast but little light upon the subject. We may note, however, that he questioned whether ozœna was really an ulceration, but leaned to the idea that it was a diffuse inflammation. He speaks† of the liability of the mucous membrane of the larynx to become gorged with serum during inflammation. He succeeded by traumatism in

* Die Krankheiten des Larynx und der Trachea; Virchow's Handbuch der Spec. Path. und Therapie, 1854.

† Traité d'Anatomie Descriptive, 1802, T. II, p. 399.

producing this condition in dogs, but we look in vain for those details of the study of the respiratory mucous membranes, which later followed, from Bichat's initiative, in the works of Bretonneau and others.

In 1791 Fourcroy and Vauquelin had* examined nasal secretions, both in healthy subjects and in those suffering from coryza, and had noted the salts of lime and soda. According to him, the mucus was the same from all the mucous membranes, but Berzelius later, on the contrary, believed it to vary according to the locality from which it was taken. Majendie thought that the mucous glands are not necessary for its formation, but that it is found where there are none, and also after death.

Bretonneau
and Diph-
theria.

These were some of the preliminary studies which, together with the direction given to medical study by Bichat, lead to Bretonneau's Treatise on Diphtheria. In the works of Matthew Baillie, which, though not collected until 1825, were of a considerably earlier date, may be found several accurate accounts of the post-mortem appearances in those dead of Croup.†

Anglada says: "It is known that Napoleon, in 1807, on account of a sorrowful event, put the question of Croup to the Assembly; numerous and important works followed." He offered a prize for the best essay on the disease, owing, it is said, to the death of a son‡ from it. Not only in France, but elsewhere, as we have seen, the disease was being more carefully studied. John Cheyne, in 1809, wrote on "The Pathology of the Membrane of the Larynx, and Bronchi," a treatise which is chiefly upon the lesions of Croup, under which title he also published a work.

It was not, however, until Bretonneau's publication, in 1826§, that any very great advance is to be noted in the nineteenth century in the study of Diphtheria. He recognized its specific character and thus gave it its name (p. 41-43): "From the impossibility of applying to a special inflammation, so well defined, a single one of the names which have been given to its variations, allow me to designate this phlegmasia by the name Diphtheritis, derived from ΔΙΦΘΕΡΑ" which means a skin, an exuvium.

* Annales de Chimie, Aout. 1791, Vol. X, p. 13.

† See also "The Morbid Anatomy of Some of the Most Important Parts of the Human Body," 1793, and "A Series of Engravings," etc., 1800, III Plate II, Fig. 1.

The word Croup, first used by Home, is of Scottish origin, designating a membranous inflammation of the air passages, and is said to have primarily signified strangulation, but it is from a Gothic root, meaning to cry out, the term being applied to the disease probably on account of the altered tone of the voice.

‡ If this is so, it must have been an illegitimate son. Coatsworth in his Memoirs of the Private Life of Napoleon, mentions no such event as the death of an illegitimate child at this time.

§ "Traité de la Diphtherie," 1826.

His work gives by far the best description of the disease which had yet appeared, but even in its clinical manifestations the differentiation was much at fault. In addition to his own remarks on the disease, he transcribed the works of many previous writers, among them that of Samuel Bard. He had performed tracheotomy for the laryngeal disease, and was of the opinion that his was the first case in which it was successfully done, though he refers to the case in London reported by Borsieri which I have cited. Bretonneau's work produced a great impression upon his contemporaries, and it is one of the landmarks in the history of diseases of the throat. Shortly after its publication, we may note the report of a fatal case of nasal diphtheria by Billard*, but he does not give it that name.

Bichat† from experimentation had come to the conclusion that the epiglottis was in no way essential to the production of the voice, which, however, was altered when he cut off the tops of the arytenoid cartilages, and was lost when he severed them from one another in the middle line. We have seen how gross an error had entered into the conception of the ancients in supposing the epiglottis served to keep solids from the larynx, but permitted fluids to enter it. It gradually was accepted as an efficient valve to keep the latter out also. Majendie refused to accept this on authority. He said‡ he himself was of the former opinion, except for the doubt that should always exist in the mind of the physiologist. On extirpating the epiglottis in dogs he found they swallowed fluids as well as solids quite as easily without it. Elsewhere§ he asserts he had observed the same phenomenon in two individuals deprived of the epiglottis by disease. He, therefore, concluded that it was not indispensable in deglutition. From various experiments on animals he did much, not only to elucidate the mechanism of swallowing, but the action of the intralaryngeal muscles as well, though his conclusions have not been all of them confirmed by later investigations. One notes the significance of the new order of things in France at this time in the field of medicine as well as in all other subdivisions of science.

Le Gallois|| in 1812 inaugurated a series of investigations as to the innervation of the larynx, to which later writers have not since added so large a number of well ascertained facts as we might expect from advances in other fields of physiological research.

The Epiglottis.

Innervation of the Larynx.

* "Traité des Maladies des Enfants," 1828. I have seen only the second edition, 1833.

† "Traité de l'Anatomie Descriptive," 1802.

‡ "Mémoire sur l'Epiglote," 1813.

§ "Précis Elementaire de Physiologie," 1817, Vol. 2, p. 63.

|| Le Gallois: "Experiences sur le Principe de la Vie." 1812.

Dupuytren and Bichat had both observed the effect of cutting the pneumogastric, and many, since Galen's account, had noted the results of section of the recurrent laryngeal nerves, but it remained for Le Gallois to demonstrate that death, which so often supervenes, especially in young dogs, when the pneumogastriks are cut, was due to section of the recurrent fibres in it, and that this also happened when both recurrents were simultaneously cut. He noted this happened less suddenly, the older the dogs were. He found that the glottic aperture was more narrowed by the operation in young than in old dogs. He also drew attention to the varying effects from ligation of the recurrents, due to the degrees of pressure exerted. Le Gallois did not take so much pains to record the color and sex of the dogs in his experiments, but on the perusal of his work it may easily be seen how much of the work of more recent, more voluminous, and less readable experimenters was anticipated by him.

Sir Charles Bell* in 1821 asserted that because the vagus nerve does not arise by a double root and has no ganglia, it is not a nerve of sensation, he having shown, simultaneously with Majendie, that the posterior roots of the spinal nerves are sensory and the anterior roots are motor filaments. Another theory of Majendie was contradicted by Robert Willis in 1829, and later by Claude Bernard. They showed that it was erroneous to regard the superior laryngeal nerves as supplying filaments to the closers of the glottis, and the inferior laryngeal nerves as sending branches exclusively to the openers of the glottis. Willis, according to Holmes, did much to elucidate the actions of the various intralaryngeal muscles, a matter still involved in much uncertainty†. Marshall Hall in 1836‡, and Dr. John Reid, as well as Majendie, contributed largely to the development of our knowledge of this intricate subject. Hall was apparently the first to point out the reflex nature of Spasmodic Croup. His idea that it is due to the irritation of teething, indigestion and constipation has been much invalidated, but only in very recent years.

Sir Astley Cooper, in drawing attention to his discovery of the ganglion of the superior laryngeal nerve in the vagus, opened the

* "On the Structure and Function of the Nerves."

† Some of the statements ascribed to Willis by Holmes had been long previously made by other observers.

‡ "Lectures on the Nervous System," and especially later in 1841 in his book "Diseases and Derangements of the Nervous System."

way for Cock* and Hilton† to declare the internal branch was exclusively a nerve of sensation, the inferior or recurrent nerve being the exclusively motor nerve of the larynx and the external branch of the superior laryngeal supplying the crico-thyroid muscle. Dr. John Reid‡ confirmed these conclusions and added many new facts by his investigations upon the glosso-pharyngeal and vagus nerves.

Majendie was of the opinion that section of the superior laryngeal nerve prevented the emission of almost all acute sounds, but Longet§, who prefaces his account with an exhaustive bibliography of the work of previous observers, declared, as had Bischoff before him, that the section of this nerve produces no effect upon the voice in dogs. They also asserted that the Spinal Accessory is the motor root of the pneumogastric nerve, Galen having considered the former a branch of the latter. They cut the Accessory filaments within the skull and obtained aphonia and hoarseness in animals. Notwithstanding this, Claude Bernard||, that materialistic philosopher, who in many ways exercised such a pernicious influence on French thought in the decades which followed him, insisted that the Spinal Accessory is a motor nerve and the Vagus is a mixed one at their origin, and that they do not bear the relation to one another of the anterior and posterior roots of a spinal nerve, but that the Spinal Accessory is a motor nerve which regulates the movements of the larynx and the thorax every time these organs are to produce phonation, and that the Pneumogastric regulates them in respiration. Therefore the Spinal Accessory should be regarded rather as the antagonist than as the co-efficient of the Vagus, as phonation for the moment suspends the act of respiration. He confirmed the observation by Majendie as to the lack of effect on the voice of the section of the superior laryngeal nerve, which lesion induces anæsthesia of the larynx.

The history of the advance in the knowledge of the innervation, and of the kinetic phenomena of the larynx, is intimately associated with that of voice production. It therefore seems best that some account of it should be given here, though this must be done in the most cursory way. Full accounts of the progress of such knowledge

Voice Production.

* Edward Cock: "Gray's Hospital Reports," 1837, p. 311.

† John Hilton: Ibid, p. 514,

‡ "Edinburgh Medical and Surgical Journal," 1838, Vol. 49, p. 109.

§ "Anatomie et Physiologie du Système Nerveux," 1842, T. II, p. 271.

|| "Archives Generales de Medicine," 1844, April, p. 397, May, p. 51.

may be readily found in the separate treatises of Gordon Holmes,* of Fournié† and of others. We must retrace our steps considerably. We have seen the very crude ideas of Democritus, Hippocrates and Aristotle, and we have to regret the lost treatise of Galen on the voice, which perhaps would have revealed to succeeding generations clearer ideas on the subject. We find in all the Præ-Renaissance and Arabian works constant reference to Galen's conception of the larynx—in mediæval Latin, the “principalissimum organum vocis.” The first reference, which I have noted after Galen, to a more extended and exact conception of laryngeal physiology is to be found in the remark of Paré on the anatomy of the larynx. “When the cartilages are open the voice is large like the Basse-Contre. On the contrary, when they are compressed, the voice is shrill.” It was long after the time of Paré before the matter was taken up as a separate study. Casserius indeed, in his work on the larynx, discusses voice formation to a considerable length, as did many other anatomists incidentally, but it was Claude Perrault (1613–1688) who first explained the voice by mechanical laws and especially endeavored to demonstrate that it is produced only by the larynx without the trachea taking any immediate part in it.‡ He compared the larynx in birds and animals with the human organ.§ “As regards the tone of the voice, it is low and grave when the glottis makes a long slit, because this makes the lips relaxed and their vibrations slower.” He insisted that the upper parts of the air passages take part in the formation of the voice. He likened it to a flute, the muscles at the larynx working the variations.

Shortly after this Dodart|| took the matter up. He insisted that the trachea only furnishes the material of the voice, *i. e.*, the expired air. The glottis is the only organ of the voice. All the effects of the glottis for tones depend on the tension of its lips, and of its various internal structures. The concavity of the mouth has no part in the production of the voice, but it is a modifier of it, and still more is this true of the nose. He showed that Galen's comparison to a flute could not be accepted, if one went into details. He spoke of the vibrations of the ligaments, and of the

* Holmes: “Vocal Physiology and Hygiene,” 1879.

† Fournié: “Physiologie de la Voix et de la Parole,” 1866.

‡ Sprengel: l. c. V. 150.

§ “Oeuvres Diverses de Physique et de Mécanique,” Edit. 1721, Vol. 2, p. 392; also *Ibid.*, Vol. I, p. 220, II partie, Du Bruit.

|| “Mémoire sur les causes de la Voix de l'Homme,” par M. Dodart, *Mem. de l'Académie des Sciences*, 1700, p. 238.

dilations and contractions of the glottis. He asserted the trachea is elongated in high notes, and shortened in low ones. He likened the vocal organ rather to a horn or trumpet. According to him, the glottis is the place which corresponds to the lips of the musician; the body of the instrument extends from the glottis to the external orifice of the vocal canal, that is to say, to the mouth.

In 1742 Ferrein modified the conception of Dodart somewhat by comparing the larynx to a stringed instrument such as the violin.* He was the first in accordance with this idea to apply the name "vocal cords" to the lips of the glottis. Dodart, as we have seen, had taken note of the oscillations of these ligaments, but Ferrein more particularly saw in them the principal instruments of the modulation of the voice, and he reported a number of observations which tended to prove that the air in striking the glottis produced different tones according to the vibrations which these parts performed. Bertin, in 1745, inclined to the simile of Dodart, asserting that the vibration of the glottis was not sufficiently free to allow comparison with the oscillation of cords. Ferrein's view was adopted by Montagnat (1746), who called attention to the second larynx in birds, which is supplied with a taut membrane which is able to produce the same notes as the ligaments of the glottis. Haller in his great work† wrote a long dissertation upon the voice and the parts played in its formation, by the various structures of the nose and throat, referring to the accessory sinuses as having the function of making the voice more sonorous. He seems, however, to have added very little that was original to our actual knowledge, and the same may be said of Walther‡, but the latter has much to say of the intralaryngeal movements.

We should not pass on to the nineteenth century in this matter without taking note of the noble labors of Johann Conrad Amman.§ Although Hartmann says that the Spanish Benedictine monk, Pedro de Ponce, in the sixteenth century, proved that deaf mutes can be taught to speak, Amman's is the first treatise upon a method of teaching the mute to talk. He followed practically the same method of teaching as is now used in the various institutions for that purpose, *i. e.*, lip reading.

* Vid. Sprengel l. c. and Columbat: "Traité des Maladies et de l'Hygiène des Organes de la Voix," 1838.

† "Elementa Physiologica." Ed. 1741. Tomus III, Lib. 9.

‡ "De Hominis Larynge et Voce." Haller's Disp. Anatom. 1749 Vol. IV, p. 691.

Surdus Loquens sive Dissertatio de Loquela, 1740.

Under the impetus of the new life in France, Majendie took up the study of voice production where it had halted for the best part of a hundred years. He was the first who actually saw by experimentation on animals the vibration of the vocal cords "in vivo." He* again more confidently compared their actions to the vibrating bands of wind instruments, this in animals depending on the contraction of the laryngeal muscles rendering the vocal cords taut, the intensity and volume of the voice depending on the extent of the vibrations, and this depending on the length of the cords, the size of the larynx and the amount of the expulsive force of the air current. In contradistinction to Ferrein, he taught that the tones of the voice depended not so much on the tension of the cords as upon the length of their vibrating surfaces, deep tones being due to the vibration of the whole length of the cord, and the high notes to the vibrations only of the posterior portions, varying with the height of the note. The larynx rises in high notes and descends in the low notes, thus lengthening and shortening the vocal tube. He regarded the ventricles of the larynx as anatomical devices to allow of the separation of the true from the false cords. He differed from Bichat in supposing the epiglottis to have something to do with the formation of the voice. He also noted the modifications of the voice by the cavities of the mouth and nose. Holmes (l. c.) refers to Liscovius as having dwelt upon the importance of the width of the vocal slit in voice production, a matter appreciated, as we have seen, by Dodart and exaggerated by Paré before him. Sehfeldt, in 1835, was the first to state that the falsetto voice is produced by the action alone of the edges of the vocal cords. Holmes says that Biot in 1816 originated, and Cagniard de la Tour by his invention of the siren† in 1825 demonstrated the accepted theory of sound produced by the vibration of tongued instruments.

Mayer‡ and the great Johann Müller§ wrote at great length on the subject, but in a manner most discouraging to the modern reader. In this respect, however, they were surpassed by Harless.¶ He wrote a two hundred page article on the voice, in which the most exhaustive examination of the anatomy of the parts was made. His-

* Majendie: "Précis Elementaire de Physiologie," T. I, p. 210.

† The siren consists of a revolving plate pierced by holes at its circumference, through which on passing in its revolutions over an aperture air is forced, the rapidity of the revolutions regulating the pitch of the musical note produced.

‡ Mayer: "Archiv fur Anatomie und Physiologie," 1826, p. 188.

§ Müller: "Handbuch der Physiologie des Menschen," 1840-2, p. 179.

¶ Emil Harless: "Wagner's Handwörterbuch der Physiologie," 1853, IV, p. 505.

tological, chemical, dynamic investigations are detailed with unwearied industry and indefatigable zeal. Its very ponderosity has buried it in oblivion. It is highly probable that a careful study of it might reveal matters of interest to the modern student, brave enough to undertake the task.

This brings us up to Garcia's invention which revolutionized the study of voice production. Many works rapidly appeared, among which may be mentioned Merkel's "Funktionen des Menschlichen Schlund und Kehlkopfes" (1862). He had previously, before the importance of the advent of the laryngoscope was appreciated, written his "Anthropophonik." In 1861 Bataille in a memoir* presented to the Academy of Sciences, following up the suggestion of Garcia, advanced very decidedly the knowledge of the finer intralaryngeal movements in phonation and in singing, though his results were stated somewhat dogmatically. Notwithstanding the invention of the laryngoscope and the numerous exhaustive monographs on the subject of voice formation, among which may be noted Grüntzner's†, little was established beyond what had been discussed in prae-laryngoscopic days. The photography of the larynx by French‡, a triumph of ingenuity, skill and persistence, resulted in upsetting many of the ideas, conceived not only by the early investigators, but much also which had been advanced since the introduction of the laryngoscope. Willis in 1830 advanced the idea that the vibration of the air in the cavity of the mouth was independent of the vibration of the laryngeal air, and thus the formation of the voice was a complex process. This idea was superseded by the somewhat similar but modified over-tone theory advanced by Helmholtz§, who derived the idea from Wheatstone.¶ This has since been the prevailing theory of voice production, which, with modern apparatus of precision, is being so scientifically investigated by Professor Edward W. Scripture.¶

Photography.

Modern Theories.

Litré** seems to think a passage in "Disease II." is a proof that Hippocrates, or rather the author of this Hippocratic treatise, had observed phthisis laryngea, because he alludes to ulcers in the tube

Laryngeal Phthisis.

* *Nouvelles Recherches sur la Phonation*, 1861. Ref.: "Gaz. Hebd. de Med. et Chirurg," 17 Mai 1861.

† "Hermann's Handbuch der Physiologie," 1st B-d, IIte Theil, 1879.

‡ *Trans. Am. Lar. Ass'n*, 1832

§ *Lehre von den Tonempfindungen*, 1862.

¶ "London and Westminster Review," 1837.

¶ *Experimental Phonetics*.

** Litré: "Œuvres Complètes d'Hippocrate," Tome VII. p. 77.

of the lungs. If we are to suppose that this book had its origin in the School of Alexandria, where they were familiar with the dissection of the human body, this may be a valid conjecture.

Before the advent of laryngoscopy there was considerable progress made not only toward the correct understanding of tubercular disease, but towards the recognition of its manifestation in the larynx. Virchow has pointed out* how a mistaken interpretation of Sylvius de la Boe led him to confound small tubercular cavities in the lungs with suppurating conglomerate glands. Clinical observation had frequently noted the enlargement of the so-called conglobate glands associated with evidences of pulmonary phthisis. From this, and subsequently through the works of Morgagni, Cullen and many others, the conception gradually arose that there was a pathological connection between vomicæ in the lungs and the enlarged lymph glands. This is a singular instance of how out of error much that is true in pathogenesis arose. We have seen Sylvius de la Boe interested in separating the conglobate from the conglomerate glands, and we need not, therefore, be surprised at finding him mistaken as to the cavity of the dilated conglomerate glands being identical with foci of suppuration in the lungs.

Morgagni.

The history of the growth of our knowledge of laryngeal phthisis is usually traced back to Morgagni. Again we note that growth means differentiation. Tuberculosis and syphilis are inextricably confused in the early accounts of phthisis laryngea. According to Morgagni in his discourse on the lesions of respiration†, Fantoni had noted in the cadaver of a man the mucosa of the arytenoid cartilages so ulcerated and thickened that there only remained a very small laryngeal opening through which the patient, who had lived in this condition a long time, had breathed with great difficulty. Morgagni then described the case of a woman of forty who had been asthmatic for some time, and she having died nothing was found in the lungs or brain to account for her symptoms. At Morgagni's suggestion, the larynx was brought to him. He opened it from behind and pus of a grayish color flowed out, and from such a situation that the swelling it caused must have projected into the larynx and produced dyspnœa. Notwithstanding this memorable case has been frequently cited as one of tubercular laryngitis, I am very much of the opinion that it was a case of syphilis. However that may have been, evidently it, with some other similar observations reported by Bonet, Santorini and others, impressed Morgagni with the necessity of directing attention to the larynx in cases of dyspnœa,

* "Die Krankhaften Geschwülste" III, 621 et seq.—Ed. 1867.

† "De Sedibus et Causis Morborum." No. 12.

not only at post-mortem examinations but clinically. He did not fail to lay emphasis on this point, and his remarks soon aroused interest in the study of such lesions.

Lieutaud, who, in a very inferior manner, continued the work of Morgagni, reported* several cases, which at post-mortem presented lesions in the larynx which may have been tubercular.

Petit (1790), Portal (1792), Sauv  (1802), Saignelet (1806), wrote theses on laryngeal phthisis in which it is difficult to separate the syphilitic from the tubercular cases, but in which the various symptoms and lesions common to both are set forth at length.

Matthew Baillie,† in 1793, noted frequent appearances in the lungs at post-mortem to which he gave the name of tubercle, but he declared they did not occur in the branches of the trachea "where there are follicles. They are solid or they may break down." Nevertheless, it would appear, in the edition published in 1825, after his death, that he had observed the walls of the trachea thickened and the mucosa covered by little hard tubercles accompanied by a scirrhus affection of the glands. He also referred to inflammation of the tracheal mucosa and its ulceration "where there are scrofulous abscesses of the lungs. The same appearances are observable in the mucous membranes of the larynx."‡

Whatever may have been the real conditions referred to by Baillie, Broussais§ in 1806 noted white miliary tubercles in the larynx of a man dead of pulmonary phthisis. There was also an ulceration in the ventricles of the larynx. His observation seems to have been first published in 1816. Previous to this Bayle|| had published his varieties of phthisis pulmonalis, the first of which was tubercular. He described its three stages, the state of tubercle, its softening, its cavernous or cystic stage. He is also said to have been the first to make use of the term "tubercular diathesis."¶

Laryngeal
Tubercle.

While, therefore, tubercle had been recognized, not only in the lungs but in the larynx, before Laennec's publications, he more clearly and definitely than others pointed out the characteristic lesion, to which he himself fell a victim, dying in 1826, at the age of forty-five. In his treatise on the Diseases of the Chest,** he thus

* "Histoire Anatomica Medica" Tom. II, Lib. IV., p. 297, seq. 1767. Obs. 65, 67, 67a, 68. The last observation presents more satisfactory evidence of the lesions having been tubercular than the others.

† "Morbidity Anatomy of Some of the Most Important Parts of the Human Body."

‡ The Works of Matthew Baillie, Vol. II, p. 84, et seq., 1825.

§ "Histoire des Phlegmasies," 1816. Tome I, p. 372.

|| "Recherches sur la Phthisie Pulmonaire," 1810.

¶ "Journ. de Med. Chirurg. Pharm.," etc., An. XI, T. VI, p. 28.

** Translated by John Forbes, 1823.

defines phthisis pulmonalis at the beginning of his book: "The existence in the lungs of those peculiar productions, to which the name tubercle has been restricted by modern anatomists, is the cause and constitutes the true anatomical character of consumption." He described their formation, regarding them as adventitious matter forming in the pulmonary tissue.

A very full and satisfactory account of the condition of the knowledge of laryngeal phthisis prior to Louis' celebrated work may be found in the thesis of Pravaz.* Unfortunately we are still in a position to thoroughly understand the vivid impression made upon the author by the death of his mother from this formidable affection, and we also understand his bitter quotation of the expression of Asclepiades in regard to Hippocratic medicine where he says it was the contemplation of death. He says: "No one can doubt to-day that laryngeal phthisis may exist primarily." This to the modern reader is explained by the citation of such cases, cured by the administration of mercury.

There is a notice in a publication† in 1818 that creosote was used in the form of a fumigation of tar, and it was suggested that this might be useful in laryngeal phthisis, but as a rule treatment was regarded as of no avail.

The advent of the more exact methods of diagnosing pulmonary disease by physical examination, corresponding to the more general study of its anatomical lesions, resulted in a considerable increase of attention given to tubercular lesions of the upper air tubes.

Louison Phthisis and Catarrhal Ulcers of the Larynx.

The work of Louis‡ forms an integral part of the history of Phthisis, but in a work of more than 500 pages hardly fifty are devoted to the manifestations of the disease in the "tracheal artery," the larynx and the epiglottis. To the lesions of the latter he devoted especial attention. In 102 cases at autopsy the upper air tubes were examined and lesions were found—of the epiglottis 18, of the larynx 22, of the trachea 31. While he did not recognize, as did Broussais, tubercle in the larynx, he supplemented the work of Laennec by its careful description in the lungs. The work of Louis is more frequently quoted in laryngology as having given origin to the idea that the ulcers of the larynx in phthisis are due to the mechanical raspings of secretions, cast off from the tubercular lesions of the pulmonary tissue. This mistaken conception has hardly yet entirely disappeared from our nosology of disease, in spite of the early work

* "Resherches pour servir a l'Histoire de la Phthisie Laryngée. Thèse de l'Ecole de Médecine de Paris," No. 56, 1824.

† "Dictionnaire des Sciences Médicales," 1818, Vol. XXVII, p. 264.

‡ "Recherches Anatomico Pathologique sur la Phthisis," A. Louis, 1825.

of Rokitsansky and Virchow. This was asserted not only in the first edition of his work, but repeated in the second edition in 1843. He seems to have been the first to use the term and draw attention to the existence of latent phthisis, a matter with which advancing science has made us more familiar.

"Latent Phthisis."

While far less exhaustive and valuable we may note in the work of Andral in 1834* more accurate views than those of Louis as to some matters pertaining to laryngeal Phthisis. He gave a long description of it, noting the occurrence of tubercle in the larynx.

Barth, writing in 1839, referred to fifteen or sixteen authors who had by that time written on the subject of laryngeal phthisis. By far the most exhaustive and the most valuable was the work of Trousseau and Belloc†, which still remains a classical authority on the subject. Their differentiation of the lesions was still far from perfect, but they were aware of this confusion in the works of previous writers. Thus they quote Borsieri as saying in 1826, "There are those who think ulcers of the larynx and the aspera arteria, because they are not situated in the lungs, should be excluded from phthisis. However, from these lesions also the body often wastes away, and is consumed by a slow fever just as in the parent disease." Their assertion that he was the first to recognize laryngeal phthisis as in itself an essential disease is, as we have seen, hardly accurate. They included in their category of laryngeal phthisis:

Trousseau and Belloc.

1. Simple laryngeal phthisis produced by the common causes of inflammation in general, without pulmonary phthisis.

2. Syphilitic laryngeal phthisis.

3. Cancerous laryngeal phthisis.

4. Tubercular laryngeal phthisis.

Notwithstanding their recognition of tubercle in their last division, we see in their first the influence of the catarrhal theory of Louis, and the evidence of insufficient differentiation and faulty diagnosis, while their other two classes give evidence of a considerable advance in differential diagnosis over the works of their predecessors. Practically, however, when we come to study the reports of many of the cases classified thus, we will find considerable confusion. In this respect the slightly later memoir of Barth‡ gives evidence of a more correct understanding, as he separated more intelligently the syphilitic from the tubercular cases. We may now note the beginning of a more careful limitation and definition of the word tubercle.

* "Clinique Medicale."

† "Traité Pratique de la Phthisie Laryngée de la Laryngite Chronique, et des Maladies de la Voix," 1837.

‡ Mémoire sur les ulcerations des voies aériennes. "Archives Generales de Medicine," 1839, 3me, serie No. 5, p. 137.

Hodgkin* notes a distinction, first that the term is applied to the shape or contour of a formation, and second to adventitious deposits as first used by Laennec.

Rokitansky.

We have now arrived at the time of Rokitansky, who inaugurated a system of study of morbid lesions, which was far in advance of anything which had yet appeared in Medicine. Many of his ideas are now rejected, but many more contained the germs of doctrines which still rule in the field of pathological medicine. In accuracy they were far in advance of contemporaneous research, and rapidly gained almost universal acceptance, especially his errors. He also looked on tubercle as an exudate of coagulated protein stuff, and in this era, when the knowledge of the cell was still in its infancy, he asserted that this exudate was embryonic tissue, or Blastema which had not yet undergone organization.† He nevertheless recognized that the ulcers occurred from the breaking down of this tubercular exudate. He regarded primary tuberculosis of the larynx as an exceedingly rare affection. The lesion of tubercle was more carefully described than ever before, and at last we note there is here‡ no indication of his confounding it with syphilis. In continuing the history of the old conception of tubercle, I need only refer to the paper of Rheiner, ten years later§, in which again appeared the idea of Louis, that the ulcerations of laryngeal phthisis are mechanical and catarrhal in their origin.

We may here take note of matters of further interest in the works of Rokitansky. In spite of his careful observations he spoke of the existence of dilatation of the larynx, corresponding to the condition of bronchiectasis in the lungs. He dealt in a systematic way with the hyperæmia and anæmia, the acute and chronic inflammations of the mucosæ of the upper air passages, their hypertrophy and atrophy, noticing the changes in the glands and describing polypi as a result of inflammatory action. It is a little difficult to understand the nature of the condition he refers to as blennorrhœal catarrh and stenosis of the larynx. Besides his mistaken conception of tuberculosis, he more accurately described the exudative processes of croupous inflammation, dividing them into several varieties, including the "true croup" of children. He spoke of the lesions in the air passages of variola and typhus fever as submucous processes involving ulceration of the mucosa and

* "Lectures on the Morbid Anatomy of the Serous and Mucous Membranes," by Thomas Hodgkin, 1840, Vol. II, p. 132.

† "Handbuch der Path. Anat.," 1846, B-d. I, p. 391,

‡ L. C., Vol. III, p. 36.

§ "Virchow's Archiv," B-d, V. 1853, p. 534.

perichondritis. He described benign epithelial growths, mucous polypi, and the laryngeal excrescences of syphilis and tuberculosis. Fibrous tumors are also noted as well as malignant growths. In short, in the pathology of the larynx as well as in that of other regions we cannot fail to remark the great services rendered by Rokitsansky. Unfortunately lesions in the air passages above the larynx did not receive the same careful study at his hands.

As a contrast to the importance which the word tubercle has assumed in our terminology, the reader of the medical literature of this period will find much said of another phenomenon of disease in the larynx described by Bayle. Among the conditions which later studies in pathology have banished from the nosology of disease as an entity in itself, we frequently recognize the term *Œdematous Laryngitis*. The early treatise of Bayle* in 1817, however, cannot be justly blamed for having failed to give the term its proper place, for the author declared that it was a stage of many local and general diseases. Nevertheless many subsequent writers accepted the designation as creating a proper basis of classification for many cases. Sestier,† especially, in a voluminous work in 1852 attempted to bring many fundamentally different pathological conditions into one category on this basis. Some years before this D. Ludwig‡ described a clinical condition arising from infection of perilaryngeal tissues which is still described 'under his name. "Ludwig's Angina," on any basis of etiological classification, in spite of its peculiar condition of board-like hardness, deserves, as little as Bayle's "*Œdematous Angina*," a place in modern nosology.

*Œdematous
Laryngitis.*

"Ludwig's
Angina."

We cannot proceed further in an intelligible account of any part of the history of medicine without a few words as to the history of the discovery of the cell. It would be difficult to understand how the early microscopists failed to note more frequently and to study more carefully this unit of all living matter in the animal and vegetable world, were we to forget the small range of their magnifying glasses, the imperfection of the correction of the aberration of light, and more especially the imperfect technique in preparing solid tissues for microscopic examination. An English physician, Robert Hooker, in 1665, examining with a glass a little section of cork, saw cavities in it which he called cells and likened to a honey comb.

The Cell.

* "*Œdème de la Glotte ou Angine Laryngée Œdemateuse*. Dict. des Sciences Médicales." T. 18, p. 505.

† "*Traité de l'Angine Laryngée Œdemateuse*," 1852.

‡ "*Medinische Correspondenz Blatt des Wurtem. Artze, Verein*." B-d. VI, No. 4, Feb. 5, 1836, p. 21.

Subsequently, in 1671, Grew and Malpighi comprehended something of the significance of this discovery of the structure of the vegetable kingdom. It was another Englishman, Robert Brown, who first noted, in 1831, that in many families of plants a circular spot which he named areola or nucleus was present in each cell; and in 1838 M. J. Schleiden asserted that a similar spot or nucleus was a universal elementary organ in vegetables. The same phenomena had begun to be observed in animal structures, and in 1839 Schwann, a pupil of that man of genius, Johannes Müller, announced the important generalization that there is one universal principle of development for living organisms and that is the formation of cells.* The fruits of the labors of these men and others, their predecessors and contemporaries, were spread broadcast over all fields of medicine, and Virchow's apothegm "Omnis cellula e cellula" became the shibboleth of pathology after the middle of the century.

Epithelium of
the Mucous
Membranes.

Henle†, as early as 1838, declared that the mucous membranes of the body are lined with epithelium, and in regard to the nasal mucosa he said: "From the openings of the nares the pavement epithelium extends internally for some distance upon the nasal septum as well as upon the alæ nasi, on a line which, upon the septum and upon the lateral walls of the nose, one may imagine as being drawn from the free border of the nasal bone to the anterior spine, occurs the change from a pavement epithelium to a ciliated epithelium." Later, in 1843‡, he more exhaustively treated the whole subject.

William Bowman§ in 1845 described the sweat glands of the skin as tubular diverticula. He subsequently|| described similar structures in the nasal mucosa, which in the meanwhile Kölliker¶ had also noted in the mucosa of the upper part of the nose, and to which he had given the name of Bowman's glands. The racemose glands of the mucosa, as we have seen, had long since been known. Henle (l. c.) had regarded the tonsils as of a similar nature, and even as late as 1866** he is somewhat obscure as to their character, retaining the old name suggested by Sylvius de la Boe of the

The Tonsils.

* Vid. Sir William Turner's Presidential Address, "The Popular Science Monthly," October and November, 1900; also Henneguy: "Leçons sur la Cellule," 1896.

† "Archiv. für Anatomie, Physiologie," etc., 1838, p. 103.

‡ Histoire des Tissues, in the "Encyclopédie Anatomique," Vol. VI.

§ The Physiological Anatomy and Physiology of Man, Todd and Bowman, Vol. I, Cap. XIV, pp. 406-426, 1845. Also to be found in "The Collected Papers" of Sir W. Bowman, 1892.

|| l. c. II. The second volume was not published until 1856.

¶ "Handbuch der Gewebslehre," 1852.

** "Handbuch der Eingeweidelehre des Menschen."

conglobate glands of the pharynx. It was Kölliker * who first properly described these structures at the base of the tongue and in the fauces. He studied them in their simple forms in animals, but while he described the folds and depressions of the mucosæ and the follicles in their walls and the epithelium, the finer structure of the lymphatic network escaped the comparatively feeble powers of his microscope. He described the normal tonsils as "Balg-Drüsen," *i. e.*, closed, ductless glands developed in the walls around the depressions in the mucosa.† Much contention arose as to their nature. Henle (*l. c.*) Sappey‡, Sachs§ and others regarded them as true acinous glands, the lymph nodes being the acini and the invagination of the epithelium we call lacunæ being regarded as ducts. One may see in the plates of Sachs the errors into which this school fell. Sappey, in a later edition of his great work, failed to repeat this explanation of the tonsils. Brücke had also declared the tonsils were simply lymph glands, and Billroth|| called them follicular glands. Although the latter thus agreed with Kölliker and Gerlach in properly regarding them as part of the lymphatic system and related to the Malphigian corpuscles of the spleen, their conception of them was that the follicles, or, as we call them, the nodes, were really closed sacs holding grumous material, the round cells being apparently held in solution. The finer inter-cellular structure was yet to be elucidated by the investigations of His in 1862, and the curious arrangement of lymphoid tissue around the juncture of the food and air passages was pointed out by Waldeyer in 1884¶, and "Waldeyer's Ring" is now a well known but as yet little understood apparatus.

The structure of the faucial tonsils, therefore, had been largely elucidated before the development of the specialty of laryngology, and the same may be said of their abscission, which indeed we have seen fully described in the very earliest of medical annals. Middeldorpf had already described** his method of ablation by means of the galvano-cautery snare. Before this the original forms of the tonsillotome now in use had been devised. The inception of the McKenzie tonsillotome may be seen on referring to Bell's "System

Tonsillotomes.

* "Mikroskopische Anatomie, oder Gewebelehre des Menschen," B-d II, 2, 1852.

† Huxley: "Quarterly Journal of Microscopic Science," Vol. II, 1854, p. 82, who translated Kölliker's work into English, declared in his luminous language, "So far as its structure is concerned, in fact, the tonsil exactly represents a lymphatic gland, developed around a diverticulum of the pharyngeal mucous membrane."

‡ "Traité d'Anatomie," T. 3, p. 43, Ed. X, 1857.

§ "Müller's Archiv.," 1859, p. 196.

|| "Beiträge zur. Path. Histologie," 1858.

¶ "Deutsch Med. Woch.," May 15, 1884, p. 313.

** "Galvanocaustic," 1854.

of Surgery," published in 1791 (Vol. III, p. 87). This was modified in 1828 by Philip Lyng Physick*, who first used it for amputating the uvula, adapting it subsequently† to the tonsils, and using a forceps to drag them through the loop of his instrument.

Out of this grew another device for the same purpose. Fahnstock‡, four years later described the instrument which was adopted and modified somewhat in France, and is now known under his name or that of Matthieu.

Horace Green.

One of the striking incidents in the history of laryngology was the storm aroused in America, in the decade preceding the announcement of Garcia, by the persistent claims of Horace Green. The question as to whether it was possible to introduce, per vias naturales, a probe into the box of the larynx seems, on the eve of the discovery of the laryngoscope, to have been the most inconsequential of contentions, yet it excited in New York, and to some extent in London and Paris, the bitterest feelings of resentment, anger and opposition. The only explanation of the importance which was at the time attached to this contention would seem to have been the latent idea, that if they once succeeded in performing this feat of legerdemain, all the ills of the larynx would be cured. But if one may conjecture that this was the idea which lent importance to the controversy fifty years ago, it is impossible to fathom the reason which has occasionally led writers since then to regard this episode, in the history of laryngology, as anything more than a lamentable example of how coteries of medical men will insult one another, and transgress the bounds of decency in their discussion of a trivial matter. We have seen how Hippocrates referred to passing tubes into the air passages, and how it is mentioned in all præ-Renaissance medical writers. We shall see later in the history of intubation, how Desault, Loiseau, Bouchut, fully demonstrated the possibility of introducing instruments into the larynx from above. Horace Green was persecuted and reviled for claiming he could perform this operation, but this is only a part of the story. He laid himself open to criticism by claiming that by this procedure he could apply medicaments which would cause the cure of various pulmonary and laryngeal lesions, which the same vastly more accurate manœuvres, guided by the laryngoscope, are to-day unable to accomplish. His pathology, resting on the half comprehended ideas of Louis, was so erroneous and crude as to secure no support from his more scientific colleagues.

* "American Journal of the Medical Sciences," 1828, Vol. I, p. 262.

† *l. c.*, Vol. II, p. 116.

‡ "American Jour. Med. Sc.," 1832, Vol. XI, p. 249.

Very frequently a new triumph of dexterity or invention in any department of surgery leads to the erroneous assumption that because a difficulty of technique has been overcome, a new era in surgical therapy has been inaugurated.

As early as 1818 Bretonneau* had carried a probang over the aryteno-epiglottic ligaments and expressed fluids from the sponge at this point, but Trousseau denied that the interior of the larynx was reached by him.

Trousseau and Belloc in their great work, published in French first in 1837 and translated into English in 1841, described a method of making applications to the larynx which leaves us also in considerable doubt if they ever really succeeded in placing any medicament in the larynx itself. Their own doubts as to this are emphasized in the scepticism which Trousseau later evinced towards the assertions of Green, who, however, was finally acknowledged by him to have succeeded in entering the larynx. Horace Green, in 1846, published his "Treatise on Diseases of the Air Passages, Comprising an Inquiry into the History, Pathology, Causes and Treatment of Those Affections of the Throat Called Bronchitis, Chronic Laryngitis, Clergyman's Sore Throat, Etc." In 1840 he had reported a number of cases of laryngeal and bronchial disease to the New York Medical and Surgical Society as cured by intralaryngeal applications. His statements, while finding some support, were received with incredulity by a large number of his hearers. It was thought and persistently argued that it was impossible in practice to introduce instruments into the larynx. He had made his first successful attempt in 1838, a year after the publication of Trousseau and Belloc's work in France. He was subsequently charged with having derived his ideas from this book and having failed to acknowledge it. His favorite, almost his sole, local application was a 40—80 grains to the ounce solution of nitrate of silver. His laryngeal applicators had practically the same curves as those now in use. A number of prominent medical men testified to the accuracy of his statements as to the practicability of intralaryngeal applications. Immediately the book met with the bitterest reception on the part of the medical press.†

It would be profitless to follow the history of all the bitter controversy of the time. He was attacked with savage malignity, but vulnerable as were many of his other ideas, he nevertheless succeeded finally in proving that he could enter the larynx with his

* "Traité de la Diphtherie."

† Something of this may be found in the "Boston Medical and Surgical Journal," Dec. 16, 1846—et seq.

applicator. In this claim he was firmly supported, in the end, by the leaders of the profession in New York, and although even as late as 1855 Erichsen* in London, while admitting that the probang might be carried to the vocal cords, decided that it could not be introduced further.† Nevertheless in the course of the bitter contest Dr. Green was compelled to resign from one of the medical societies in New York and was even threatened with expulsion from the Academy of Medicine. The matter was fully discussed there in 1855, and an unfavorable report was made by a committee appointed to investigate his assertions. This was, however, laid on the table. He finally fully established his claims to be able to enter the larynx, but he did not succeed in proving the further claim of his ability to inject medication into the bronchial tubes and tubercular cavities of the lungs. Green eventually somewhat receded from this position, saying that he could inject it below the trachea. He grossly exaggerated the efficacy of these topical applications, saying that he had produced thereby astonishingly ameliorating effects with his nitrate of silver.

Doubtless in many cases he was self-deceived by a faulty diagnosis and by his superficial knowledge of pathological anatomy. There is, however, no doubt that he greatly benefited many cases of simple chronic catarrhal inflammations of the pharynx and larynx, and his success in obtaining a large clientèle doubtless had something to do with the jealousy of his confreres.‡

THE LARYNGOSCOPE.

We have now passed in review events of interest to us in the first half of the wonderful century just completed. Before we proceed further and enter directly upon that era in which laryngoscopy created a new field for scientific endeavor and observation, let us not forget the advance in that intellectual evolution, that most important and all-pervading element in the history of civilization, which the Germans, after their wont, have rolled together in one word and called the "Zeit-Geist." After the French Revolution there was hardly an obstacle in the world to the advance of science—none except the bigoted but almost impotent sentiment of the Church. The fagot, the rack and the boot, prison and exile, had

* "Lancet," Nov. 24, Dec. 1, 1855.

† "Bull. de l'Acad. de Medicine," 1858, Vol. 24, p. 101. Trousseau admitted that "to Horace Green belongs the honor of having methodically and systematically treated diphtheria when it occupies the larynx, by caustics introduced by the means of a little sponge. A little later Loiseau carried solutions of tannin, etc., into the larynx."

‡ For a list of the works of Horace Green see his obituary notice in "The New York Medical Journal," Jan., 1867, p. 316

long since passed away from the horizon of possibilities in the personal prospect of the man of Science. From the burning of Bruno and the degradation of Galileo to Wilberforce's undignified and maladroit taunt against the Darwinians at Oxford, a period of scarcely two hundred and fifty years had elapsed. It needed not Huxley's cutting rejoinder to remind the world that ecclesiasticism was no longer an efficient engine of intellectual tyranny.

The century had hardly opened when we find the idea existent that it might be possible, by means of a mirror to see into the larynx*. Bozzini seems to have drawn on himself an undeserved amount of criticism by the publication in 1807 of a brochure†, describing a double canula with a mirror placed at an angle at the end, which was supposed to transmit light through one compartment, and reflect it from the mirror on to the parts examined, whose image, received on the mirror, was reflected back to the eye through the other compartment. It was supposed, singular to say, that the light passing in would interfere with the perception of the reflected image if one tube was used. A wax candle with a reflector behind it supplied the illumination. This instrument was used successfully. With it and others, Bozzini claimed to be able to inspect the various canals of the body, among them, the larynx. Of course this contrivance was too imperfect to attract any attention to the idea, but the invention of Babbington, and that of Cagniard de la Tour, were practically the present instrument. Exhibited before scientific bodies it is singular, but instructive, that these should not have attracted the notice which thirty years later was given to Garcia's invention.

The Laryngoscope of Bozzini.

In 1829 Benjamin Babbington presented to the Hunterian Society‡ "an oblong piece of looking glass, set in silver wire, with a long shank. The reflecting portion was to be held against the palate, whilst the tongue was held down by a spatula." The doctor proposed to call this contrivance a Glottoscope§.

Babbington

* In McKenzie's early account of the history of the laryngoscope he committed the error of referring to Celsus as having been familiar with the use of dentists' mirrors. He evidently mistook the word specillum, meaning a probe, in "De Medicina," VII, c. XII for speculum, meaning a mirror. He was also wrong in supposing that Levret, in the eighteenth century, had any glimmer of the possibilities of the idea of laryngoscopy in recommending a polished steel tongue depressor in examining the pharynx.

Vid.: "Observations sur la Cure Radicale de Plusieurs Polypes de la Matrice, de la Gorge, et du Nez," 1749.

† "Der Lichtleiter oder Beschreibung einer einfachen Vorrichtung und ihrer Anwendung zur Erleuchtung innerer Höhlen und Zwischenräume des lebenden animalischen Körpers," von Philip Bozzini, "der Medizin and Chirurgie Doctor," Weimar, 1807.

I am indebted to other sources, chiefly Morrell McKenzie's works, for an account of this brochure.

‡ "London Medical Gazette," III, 1829. p. 555.

§ According to McKenzie, Babbington's patient sat with his back to the sun, the rays of which were reflected into his throat by an ordinary hand mirror. In McKenzie's book, "The Use of the Laryngoscope," 1865, p. 14, the laryngeal mirror of Babbington is illustrated, but in the original notice here cited, there is no reference to the method of illumination, except that a strong light is necessary.

Cagniard de la Tour. Fournié says * that in 1825 M. Cagniard de la Tour introduced into the back part of his own throat a little mirror, hoping that by the aid of the solar rays and of a second mirror he could see the epiglottis and even the glottis, but he was only partly successful.

Senn. There is still another record of this date, which is interesting in connection with the foregoing as illustrating how the idea was hovering in the air long before Garcia. Senn † in 1827 tried to use a small mirror in the pharynx to see the parts below. He used no illumination and supposed his failure was due to the small size of the mirror. Again we find a great London surgeon, who appreciated some of the possibilities of such an instrument in 1837. Liston ‡ declared: "The existence of this swelling (of the laryngeal mucosa) can often be ascertained * * * by means of a speculum; by such a glass as is used by dentists, on a long stalk, previously dipped in hot water, introduced with its reflecting surface downwards and carried well back into the fauces, a view may often be had of the parts."

Baumès. Baumes in 1838 § exhibited at the Medical Society of Lyons a mirror the size of a two franc piece, which he described as being very useful for examining the posterior nares and larynx.

Much more earnest but scarcely so successful were the efforts of Trousseau and Belloc to see the parts *intra vitam*, with which their work on laryngeal phthisis in 1837 was concerned. I may quote, directly from them, their own experience and that of others I have not thus far mentioned.

Selligue. "For several years we have been occupied with the construction of a speculum laryngis. The one of M. Selligue is known. He is a very ingenious mechanic, who, affected himself with laryngeal phthisis from which he had entirely recovered, made for his physician a speculum with two tubes, of which one served to carry the light to the glottis, and the other served to carry back to the eye the image of the glottis reflected in a mirror placed at the guttural extremity of the instrument. * * * The use of this is very difficult, and there is only about one patient in ten who can bear its introduction. Indeed it is of a volume which occupies the space comprised between the free border of the velum palate and the superior surface of the tongue." A similar instrument, the description of which we may note corresponds with that of Bozzini, was made for them, but so unsuccessful were they with it

* "Physiologie de la Voix," p. 352—quoting from the "Journal de l'Institut." No. 225 1825.

† "Journ. des Progrès," 1829, p. 231. Note—(quoted by McKenzie I, c.)

‡ "Practical Surgery," 1837, p. 350, by Robert Liston.

§ *Compte Rendu des Travaux de la Société de Médecine de Lyons*, 1836-1838, p. 62.

they denied it was possible for Bennati* to see the glottis with the instrument of Selligie. "He might have seen the epiglottis or the superior opening of the larynx, but as for the glottis, it is situated at such a depth and in such a manner that it is impossible to see it with the speculum even in the cadaver, while the irritation of the pharynx in the live subject renders it still more inaccessible, even in those who are most accustomed to it." This emphatic expression of a negative opinion as to the performances of others, was characteristic of the man who later in life, at first obstinately refused credence to the practicability of Green's topical applications, and Bouchut's intubation of the larynx.

Adam Worden† suggested the use of refracting prisms to carry the light and the line of vision to parts within the larynx, the ear and the vagina, through variously devised canulæ. He claimed that in one case he was able to see the pathological condition of the larynx.‡

This idea later also occurred to Ephraim Cutter in America,§ about the time laryngoscopy became elsewhere an accomplished fact. McKenzie (l. c. p. 22) gives a full description and an illustration of the laryngoscope of Avery invented in London in 1844. A small lamp attached to a head piece was worn on the forehead with a reflector behind it. A speculum similar to Bozzini's, except with a single tube, was used to hold the reflecting mirror.

The collection of these notes seems to make a respectable præ-laryngoscopic history of the laryngoscope. How completely the idea, dwelling in the minds of men, had failed to take root, is to be noted in the remark of Friedrich, I have quoted, regarding the impracticability of extending to the larynx any method of physical examination.

These are the brief words with which Manuel Garcia in 1855 explained his device for examining the larynx: "The pages which follow are intended to describe some observations made on the interior of the larynx, during the act of singing. The method which I have adopted is very simple. It consists in placing a little mirror, fixed on a long handle suitably bent, in the throat of the person experimented on, against the soft palate and uvula. The party ought to turn himself towards the sun, so that the luminous rays, falling

* Bennati, in a footnote to the 3d edition of his "Recherches sur la Voix Humaine," describes the instrument here referred to.

† "London Medical Gazette," Vol. II, 1844, p. 256.

‡ "Monthly Journal of Medical Sciences," 1845, p. 552.

§ A contribution to the History of Laryngoscopy by Louis Elsberg, M.D. "Archives of Laryngology," 1883, Vol. IV, p. 122.

on the little mirror, may be reflected on the larynx. If the observer experiment on himself he ought by means of a second mirror to receive the rays of the sun and direct them on the mirror which is placed against the uvula.”*

Garcia was entirely unaware of the previous attempts to accomplish his purpose with devices, some of which were identical with his own. His invention, great in utility as it was in the hands of medical men, was merely an incidental contrivance in those of the earnest teacher of singing, who desired to see the apparatus which produced the sounds he was endeavoring to train into harmony, and the remainder of his communication is largely devoted to the conclusions he drew from what he saw in his own throat of the various laryngeal movements during the act of musical phonation. The announcement, therefore, was chiefly a demonstration of autolaryngoscopy.

Difficulties of
Technique.

The crux of the difficulties which had hitherto prevented the utilization of this device which had, as we have seen, been so many times proposed, is evidenced in the notice of Garcia's communication which appeared in Paris.† “M. Garcia has the faculty of supporting in the pharynx and at the isthmus of the fauces the prolonged contact of foreign bodies without provoking in him efforts at vomiting.” Commenting on this the editor said: “As for the ingenious procedure by which he was able to see the glottis in function, I hope indeed soon to be in a position to repeat it myself.” This latter remark is an early hint as to the interest aroused by the announcement that it was possible to see a puzzling, interesting, familiar, but hitherto invisible physiological phenomenon, but it bore no trace of any thought as to the vast possibilities in the way of studying pathological phenomena.

Ludwig
Türck.

It is thus that Ludwig Türck relates‡ how his attention was directed in Vienna to the matter in 1857: “Half through accident, without knowing of my predecessors, I came to the idea of using a small mirror for the investigation of laryngeal disease. First, as I was showing Professor Ludwig the internal laryngeal structures of a patient in my hospital division, I learned of Garcia's investigations.” From that it would appear that Türck had himself invented an instrument before he knew of Garcia's. Others declare that Garcia's communication was in his hands before he came

* *Observations on the Human Voice*, by Manuel Garcia, Esq. Received March 22, 1855; *Proceedings of the Royal Society of London*, 1855, p. 399.

† M. Segond: “*Gazette Hebdomadaire de Médecine et de Chirurgie*,” Nov. 16, 1855. No. 46, p. 816.

‡ “*Klinik der Krankheiten des Kehlkopfes*,” 1866.

upon the idea. However this may have been, certain it is that Türck had worked at the problem before Czermak took it up. The latter, however, preceded him in the public announcement of his studies.

In March, 1858, there appeared a publication* upon the laryngeal mirror in one of the Vienna medical papers. It was by Professor Czermak, who said that Türck some time previously had been attempting to use some of Garcia's instruments. Czermak borrowed some mirrors of Türck for the same purpose, and his paper consisted only of some remarks on his experience, but he urged all physicians to make a trial of them. He said that Türck and Garcia used sunlight, but he made use of lamplight and advised the employment of a "large perforated concave mirror for reflecting either the sun or artificial light." Subsequently he very correctly asserted† that but for this invention of the reflecting mirror, laryngoscopy would have been "a dead born child." He urged in his first communication that by persistent practice difficulties in the technique may be overcome. Czermak's first device for fixing the head mirror seems to have been to hold the frame of the mirror between the teeth, Semeleder adapting it to a spectacle frame. (1858). Whatever may have preceded this, it is evident on a perusal of the literature of the subject at this period what an impulse Czermak's brief notice gave the whole matter. It aroused the languid interest of others, and soon excited the active resentment of Türck. Less than two weeks after this first communication in a medical journal, Czermak gave a public demonstration of the use of the laryngoscope‡. At this meeting Türck was present and claimed priority as the first to employ it for diagnostic purposes§. This Czermak admitted.

Johann
Czermak.

Controversy of
Türck and
Czermak.

Soon followed Türck's own publications||. Jealousy and strife soon began between the two men, and the history of it is an undignified record, the relation of which would serve no good purpose but to exhibit the folly of it and the harm such incidents do to the posthumous fame of otherwise distinguished men¶.

* Ueber den Kehlkopfspiegel, von Prof. Joh. Czermak: "Wiener Med. Wochenschrift," No. 13, p. 196, March 27, 1858.

† "Der Kehlkopfspiegel," 2d Edit., 1863.

‡ "Zeitschrift der Gesellschaft der Aertzte," No. 17, April 26, 1858. Sectionsbericht: Sect. f. Physiologie und Pathologie, p. 271.

§ See also: A. O. Beilage zu No. 16, "der Wiener Medizin. Wochenschrift," April 17, 1858.

|| "Zeitschrift der K. K. Gesell. der Aertzte zu Wien," No. 26, June 28, 1858, p. 401.

¶ Lists of the numerous contributions of Türck and Czermak to the literature of the subject may be found appended to their later more voluminous works.

Czermak soon opened up another region in the throat to examination. He turned his mirrors upward and demonstrated the pharyngo-nasal cavity, in Buda-Pesth, July 29, 1859*. Very shortly after this, Voltolini took the matter up† and still further developed the technique, abandoning the palate retractor used by Czermak. The latter in his early attempts at post-rhinology had also attempted the use of double mirrors, one placed at an angle above the other to show the choanæ. Czermak also introduced a mirror through a tracheal opening and demonstrated the under surface of the vocal cords. The mirrors at first and for long afterward varied in shape and size, many having bent handles. There were many subsidiary devices which complicated, but did not improve the technique, and early in the history of laryngology we may note the old idea of Aranzi by which sunlight was admitted through a hole in a shutter of a dark room and allowed to fall, either directly or through a water bottle, into the nostrils or mouth of a patient. This was rendered more efficient by the use of a deflecting or reflecting mirror‡.

Voltolini§ invented an apparatus for the manufacturing and burning of oxygen gas to be used in an incandescent light for examining the ear and larynx with Garcia's instrument.

By the profession in general, the new instrument at first was looked upon with some scorn as a physiological plaything, and the dispute as to the priority of its use may perhaps have had some beneficial effect in attracting an attention which its merits could not have effected. Türck and Czermak carried their ideas and their warfare into France. Having both published separate brochures in German on the use of the laryngoscope, Czermak in 1859, and Türck in 1860, they republished these immediately in French, and both went to Paris, where they gave public exhibitions and lessons in the new art. A commission of the Academy of Sciences of the Imperial Institute of France was appointed to investigate their rival claims. This did not choose to go into the question of priority, but accorded them both honorable mention (March 21, 1861) for the services they had rendered science in the introduction of the laryngoscope. The committee suggested that 1,200 francs for each be added to this honor.

Türck and
Czermak in
France.

* "Der Kehlkopfspiegel," etc., 1860, von Joh Czermak, also; "Deutsche Klinik," No. 21, p. 202, 1860. "Die Besichtigung der Tuba Eustachii," etc.

† "Virchow's Archiv," No. 21, p. 45, 1861.

‡ See among others Störk, "Zeitsch. der K. K. Gesell. der Aertzte zu Wien," No. 46, p. 721, 1859.

§ "Virchow's Archiv," No. 17, 1859, p. 193.

While Czermak had remarked upon some pathological conditions, he attributed the first studies in this field to his pupil, Semeleder, who in 1858, published* an account of some pathological conditions of the epiglottis and of the tongue. Störk, Türck and Gerhardt, in the same year and the next began their numerous contributions to the literature of intra-laryngeal pathology. In this Türck was especially prolific.† All these earlier works of Türck were in some form soon translated into French and English. Whatever may have been his merit as to the inception of the idea of laryngoscopy, he was foremost in the spread of the knowledge of disease revealed by it.

Clinical Use of
Laryngo-
scopy.

For the most part his idea of pathology, especially pertaining to tuberculosis, conformed to the principles of Rokitanski. He described the appearances in lupus, diphtheria, syphilis, tumors and œdema of the larynx. Störk, in 1859, in an article on the technique of laryngoscopy spoke of making laryngeal applications of nitrate of silver with the aid of the laryngoscope. Thus early was the question which agitated Horace Green and his adversaries conclusively settled without controversy. Czermak also claimed to have made applications of caustics and other drugs to the larynx under the guidance of the laryngoscope as early as 1859.

Intra-laryn-
geal
Applications.

The use of the laryngoscope quickly spread in the large cities of other lands. In London P. C. Price, apparently unacquainted with Garcia's communication to the Royal Society four years previously published ‡ an account of a steel mirror which was to be used in examining the back part of the tongue and the epiglottis. In the *Medical Times and Gazette*, August 4, 1860, there is a short editorial note mentioning the investigations of Türck and Czermak, and stating inaccurately that the mirrors used were similar to those invented ten years before by Mr. Avery.

The Spread of
Laryngo-
scopy.

Morrell McKenzie had visited Czermak in 1859, and was in Vienna during the controversy between Czermak and Türck. On his return to London in 1860, in company with Gibbs, Prosser James and others, he was foremost in the use of the laryngoscope and the study of the phenomena which it revealed, and in 1863 he obtained the Jackson prize of the Royal College of Surgeons for his essay on "The Pathology and Treatment of Laryngeal Disease," his brochure on "The Use of the Laryngoscope in Diseases of the Throat with an Appendix on Rhinoscopy" appearing in 1865.

* "Zeitsch. der K. K. Gesell. der Aertzte zu Wien," No. 28, July, 1858.

† His contributions and those of others are to be found chiefly in the "Zeitsch. der K. K. Gesell. der Aertzte zu Wien," and the "Allgemeine Medizin Zeitung" during 1859 and 1860. His brochure, "Praktische Anleitung zur Laryngoscopie," 1860, is largely a reprint of these papers together with a historical and polemical dissertation on the subject of Laryngoscopy.

‡ "The Lancet," December 24, 1859.

Windsor* gave an account of the history of the laryngoscope and pointed out the promise of its future. C. Rauchfuss† introduced into Russia the knowledge of laryngoscopy and intra-laryngeal operations.

Czermak and Türck, as we have seen, published their first books in France in 1859 and 1860. In 1861 Moura had advanced far enough in the new art to publish a treatise on laryngoscopy, a second edition appearing in 1865. Czermak besides his stay in Paris also visited London, as did Türck. The former also visited many cities in Germany, and Tobold, in Berlin, in 1863 published his "Anleitung zur Laryngoskopie," in which he adopted the principle of fixing the reflecting mirror to a stand which was eventually modified into the present so-called Tobold's apparatus. The original idea of this, however, is to be found in Türck's papers.

Votolini‡ contributed much, by the originality of his diction and the fertility of his inventive powers, to the spread and advance of the art in Germany especially as to naso-pharyngoscopy and the employment of the galvano-cautery. Post Rhinoscopy was at first eagerly pursued by Voltolini and Semeleder as an aid to the passage of the Eustachian catheter.

We have recited the attempt of Ephraim Cutter in America to utilize prisms in laryngoscopy. He and his predecessor in England, Worden, were alike unsuccessful in turning to account the principles of refraction, but his letters published by Elsberg are significant of how well extended was the idea of the practicability of laryngoscopy at the time Garcia demonstrated it.

Strangenwald¹, Church², Krackowitzer³ and John H Douglas⁴ and Horace Green in 1861 reported the new art in America.

Louis Elsberg, to whose exhaustive work§ I am indebted for much of my information as to early laryngological literature in America, in 1862|| and 1863¶, published papers on the laryngoscope and laryngoscopic technique. The latter more than anyone else was active in drawing attention in America to the value of the new art, and for some time previous to these publications he had taught the technique in the University Medical College in New York City. His attention had been attracted and his ardor stimulated by Czermak, who had sent him his book. These studies and ob-

* "British and Foreign Medico Chirurgical Review," 1863, Jan., p. 209.

† "Zur Laryngoskopischen Technik, St. Petersburg Med. Zeitsch.," No. 1, p. 22, 1861.

‡ "Die Laryngoskopie und Pharyngoskopie," 1861.

1 "American Med. Monthly and New York Review," Vol. XIV, July, 1860, p. 15,

2 "Bulletin of the Academy of Medicine," Vol. I, 156.

3 Ibid., p. 162.

4 Ibid.

§ "Trans. Am. Lar. Ass'n.," Vol. I, 1879.

|| "Am. Medical Monthly," 1862, Vol. XVIII, p. 386.

¶ "Am. Medical Times," May 9, 1863, Dec. 26, 1863.

servations he brought, in 1863, before the New York Academy of Medicine and the American Medical Association. He also thus early urged the value of topical applications to the larynx. Horace Green lived to see an instrument of precision prove, before the Academy of Medicine, the claims which he had advanced there so courageously and so tenaciously many years before, but he himself took no active part in developing in his native country the art of laryngoscopy. He died in 1866.

It was several years after Elsberg became active in the propagation of laryngology in America that others joined him.

In 1866 J. Solis Cohen, of Philadelphia, began* that long series of communications which have done so much to establish the specialty of laryngology in America and to stimulate its steady advance for nearly forty years.

In the Medical Schools and Universities instruction was soon given in the art of laryngoscopy. Türck and Semeleder are recorded as giving instruction in Vienna in 1861, the former being created professor in 1864. In other large cities, as well† as in Vienna, private and public instruction was soon to be easily obtained by the student. In 1861 Elsberg had begun teaching laryngoscopy in New York, and in 1868 in the catalogue of the "Medical Department of New York" his name appears as Professor of Diseases of the Throat, but not until 1875 was laryngology included in the curriculum of the Harvard Medical School, and that of the New York College of Physicians and Surgeons. After this it soon became a department of nearly all the teaching medical institutions. In the dispensaries and hospitals of New York City, special clinics were formed about the same time. The throat department of the New York Eye and Ear Infirmary was separated from the Aural Department in 1873. In 1875 a department for Diseases of the Throat was opened at the New York Dispensary.

Laryngologi-
cal Clinics
and Instruc-
tion.

The new specialty of laryngology found place for its publications at first exclusively in the general medical literature of the day, but especially in the otological journals (ten years latter began the first issue of "The Laryngoscope"), "The Archiv. fur Ohrenheilkunde," founded in 1864 in Vienna, and especially in the "Monatschrift fur Ohrenheilkunde," founded by Voltolini in 1866, in Berlin. The "Annales des Maladies de l'oreille, du larynx, etc.," began its issue in 1874 in France. "The American Archives of Laryngology" began its short-lived career in 1880, the "Archivii

Laryngologic-
al Literature.

* Vid. "New York Med. Record," 1866. "Am. Jour. Med. Sciences," April-Oct. 1867.

† I regret very much that more exact and accurate information is not at my disposal of the beginnings of laryngological instruction in various capitals of the civilized world.

Italiani," in 1881, the Spanish "Revista de Laryngologia," etc., in 1887, while the English "Journal of Laryngology" did not issue its first number until 1887. In 1884 Semon began his comprehensive index of laryngological literature, the "Centralblatt für Laryngologie," while it was not until 1893 Fränkel began his stately Archiv, which has done so much in the last few years to supply us with the best thought of the workers in our own special field.

This at present, of course, does not by any means exhaust the list. In fact the special literature dealing with the nose and throat has now become of such enormous bulk that it is impossible for any one man to peruse anything more than a small part of even the most important books, essays and reviews.

Text books as we have seen were rapidly issued and grew quickly from small brochures, their first editions, to the respectable volumes of Türk, Cohen, Fauvel and McKenzie. Of late years the exhaustive composite works, of which Heymann's Handbuch is the most striking example, are monuments of intellectual activity and restless endeavor. In every encyclopædic work on general medicine or surgery, laryngology and rhinology occupy a relatively large number of pages. Since Friedrich's casual remark our knowledge of the diseases of the upper-air passages has increased enormously, and the literature of the subject still more so.

Laryngologi-
cal Societies.

America claims precedence in the formation of special laryngological societies. The New York Laryngological Society began its sessions in 1873, which, however, were gradually discontinued, and the organization of a throat section in the Academy of Medicine in 1885 practically took its place. The American Laryngological Association held its first meeting in 1879 under the presidency of Louis Elsberg. The International Medical Congress of 1881 established a section for laryngology and rhinology. Other special societies were formed throughout the world somewhat later. Since 1888 they have existed in abundance, but still have a tendency to multiply. Thus was the art of laryngoscopy and the science of laryngology spread throughout the principal countries of the civilized world.

We may now take notice of the great strides immediately taken in the knowledge of the various phenomena of disease of the upper-air passages.

Laryngeal Tu-
mors.

No subject so immediately engaged attention as that of laryngeal tumors. Forming striking pictures in the laryngeal mirror, causing marked and distressing symptoms, capable of immediate relief by means of instruments under the guidance of the laryngoscope,

and last, but by no means least, affording the operator a chance to display in the most brilliant manner his newly acquired skill, the larynges of the civilized world were soon swept so clear of benign neoplastic excrescences, that one is to-day almost tempted to account for their present rarity by supposing the early laryngologists even removed the tendency to their formation. And yet even here we are able to go far back in the history of medicine, and note not only the observations of laryngeal tumors post-mortem, but even their extraction per vias naturales.

Marcellus Donatus* in a vague way doubtless referred to laryngeal growths in the early part of the seventeenth century when he spoke of warts in the throat, fauces and root of the tongue. He says they are rare, but occur at times. Edward Tyson† in 1627 wrote of having diagnosticated a polypus of the bronchi and trachea from the expectoration of fleshy masses by a young man, but he was not able to obtain an autopsy to confirm his diagnosis, and it is not certain he did not observe fibrinous shreds.

Haller‡ refers to a case of an ulcerous tumor of the epiglottis and "three scirrhus and round tubercles seated between the membranes" of the uterus. The epiglottic tumor was of such a size that wonder was expressed that the woman had not died. We may suppose it was an epithelioma.

Lieutaud in the middle of the eighteenth century recorded § observations of two cases post-mortem, in which laryngeal polypi had caused death.

"A laryngeal polypus which Levret could not ligate with his instrument, G. Köderik, a surgeon in Brussels, ligated with much ease by means of an instrument which was constructed out of a row of hollow balls. This flexible instrument may perhaps be very useful in certain cases in which the stiff catheter renders no aid." ||

The First
Intra-
laryngeal
Operation.

John C. Cheeseman, in 1817, was doubtless the first in America to describe ¶ a laryngeal growth. His is the earliest illustrations of such a growth with which I am familiar. It was a case of papilloma of the vocal cords dying without relief. Albers remarked ** in 1834 that "tumors in the cavity of the larynx belong to a class

* "De Historia Medica Mirabili." Lib. III, Cap. V, 1613, p. 243.

† "Acta Medica Thomæ Bartholini," Lib., V, p. 94.

‡ "Pathological Observations," 1756, Obs. VIII, p. 14.

§ "Historia Anatomica Medica," 1767, Vol. II, p. 297, Obs. 63 and 64.

|| This is as explicit a reference as I can find to the first authenticated case of intra-laryngeal operation for a neoplasm. Herbinaux' report in the "Journ. de Med.," Paris, 1770, not being at my disposal, I have it from Lewin's "Deutsche Klinik," No. 13, March 29, 1862, who himself quotes it from Richters "Chirurgische Bibliothek."

¶ "Transactions of the Physico-Medical Society of New York," Vol. I, p. 413, 1817. Case of a remarkable disease of the larynx and trachea, with a plate.

** "Journ. der Chirurgie und Augenheilkunde," 1834, No. 21, Heft, 4.

remarkable alike for their rarity and their characteristic symptoms," and in 1837 Trousseau and Belloc could only report from literature and their own experience seven cases.

Cheeseman's case is omitted from Ehrmann's otherwise apparently complete list of the observations which had been noted up to the date of the appearance of his work in 1850,* including his own two cases, 31 in all. He also reported two cases of laryngeal polypi in horses and three in cows. Ehrmann said something of the structure of laryngeal polypi, dividing them histologically into fibro cellular and polypoid excrescences, these latter including what we call papilloma.

Shortly after Ehrmann's paper Horace Green † published a work on the subject. He there speaks of having removed, by means of a knife and a bent tenaculum a laryngeal polyp from a child of eleven, which he could see by forcible depression of the tongue. He boldly and quickly cut the tumor at its base, certainly a very skillful operation under the easily imagined circumstances. It must of course have been a pedunculated tumor, springing from the upper part of the larynx in a very tractable patient. In another case, that of a man, he used a sponge probang and cauterized the base of what was evidently a polyp. Still another growth which was probably malignant was partly removed by knife and tenaculum.

Middeldorpf ‡ succeeded, by means of an incandescent platinum wire loop, in removing in 1853 a polyp which he supposed sprang from the upper part of the larynx. The tongue was forcibly pulled out by a sharp hook, and the tumor was encircled with the wire by means of the fingers. He at this time was able to cite 64 cases of laryngeal polypi before his own. A few only of this number had obtained relief by operative interference, yet some of these as we have seen, were extracted per vias naturales before the days of the laryngoscope. Nevertheless, this was very exceptional and when we realize that Ehrmann spoke the truth in saying, "Polypi of the larynx, left to nature, become sooner or later the cause of sudden death," we are able to appreciate what laryngoscopy did for these sufferers.

Immediately laryngological literature abounded in reports of the diagnosis, *intra vitam*, of this morbid condition. Lewin, in 1861, declared§ that he had, thus far, seen fifty to sixty cases of laryngeal neoplasms, and that they were present in five or six per

* C. H. Ehrmann: "Histoire des Polypes du Larynx," 1850.

† "Polypi of the Larynx," 1852.

‡ "Die Galvano-Cautik," 1854, p. 222.

§ "Allgemeine Medizinische Central Zeitung," Oct. 12, 1861, p. 654.

cent of all cases of laryngeal affections. He had operated on seven of these, three by cutting operations and four by caustics. Subsequently* in an exhaustive paper he pictured forceps and laryngeal and cautery electrodes. He there states he operated on his first case July 20, 1860, and upon his second case in November, 1861. We must, therefore, conclude so far at least as certain publications indicate it, that Lewin was the first to attempt the extirpation of a laryngeal growth under the guidance of the laryngoscope. Von Brun's title allotting to himself the credit of the first operation therefore is misleading†, though of course he probably knew nothing of Lewin's publication. It nevertheless gave rise to considerable controversy. After long training of his brother's throat, he succeeded in removing a growth from his larynx by means of a forceps. In another work‡ in 1865 he was able to report sixteen cases operated on in various ways.

In 1866, Elsberg published§ a pamphlet on the subject. It was a work of considerable merit, with some very good plates of the microscopical appearances of papilloma, and less good-colored plates of laryngeal growths, *in situ*. In 1867, J. Solis Cohen reported|| the intralaryngeal removal of a polyp.

The laryngeal knife, which of late has been discarded as a very dangerous instrument, was the favorite weapon of these early operators,¶ who, we may suspect, did not always report their mishaps with it. V. Bruns, however, invented a number of other devices for his work.

So rapidly did the observations of these growths multiply, that by 1871 one man was able to report from his own experience 100 cases. In this year Morell McKenzie published his essay on "Growths in the Larynx," which he differentiated into papillomata, benign epithelial growths, fibromata, fibro-cellular or mucous polypi, myxomata, spindle-called sarcomata, cystic tumors, adenomata, angiomas. He pictured various intralaryngeal instrument of his own invention, among them his laryngeal forceps, and the devices of others. His observations began in 1862, and in eight years he had seen 100 cases himself, and he was able to collect the reports of 189 cases by others, published since the introduction of the laryngoscope, ascribing the first case to Lewin, in 1860.

* "Deutsche Klinik No. 12," 1862, ff.

† "Die Erste Ausrottung eines Polypen in der Kehlkopfhöhle," von Victor V. Bruns, 1862.

‡ "Die Laryngoskopie und die Laryngoskopische Chirurgie."

§ Laryngoscopy, illustrated in the Treatment of Morbid Growths within the Larynx, being the prize essay to which the American Medical Association awarded the gold medal for 1865.

¶ Am. Jour. of the Medical Sciences, April and October, 1867.

|| Vid, "Über Kehlkopfbildungen," Archiv. der Heilkunde, von Dr. Otto Prinz, p. 153 1866.

Many observers treated them by applications of caustics, but this method soon found its proper field of therapy. It is interesting to note in the table of Fauvel,* that he had, up to 1876, seen 300 cases of laryngeal neoplasms, beginning in 1862, when he saw eight, and reaching the lightest figure in 1873, when he saw 40 cases. To the modern observer, even in our largest hospital clinics, these now seem fabulous figures. The rapid differentiation of these growths is to be noted in both McKenzie and Fauvel's works. Lefferts† was able, in 1876, to diagnosticate and operate on a case of eversion of the laryngeal ventricles, cases having been previously observed by McKenzie (l. c.) and Moxon.‡

Eversion of the
Laryngeal
Ventricles.

The Pharyn-
geal Tonsil.

We have seen that Schneider, Santorini, and Haller had fully described, under a different name, the pharyngeal tonsil. Occasional reference to the structures in the naso-pharynx is to be found in prae-laryngoscopic literature. Thus Luschka§ refers to Mayer as describing, in 1842, the lymphoid tissues in the naso-pharynx as a bursa, and Tourtual had spoken of it as the superior sinus of the fauces. Luschka more accurately described the vault as, "not smooth, but distinguished by numerous larger and smaller depressions and protuberances, and occasionally by a complete labyrinth, made of round or ovoid channels. This appearance of the vault depends upon the existence of many simple and clustered lymph glands," which are arranged in a manner similar to the faucial tonsil. Later, in another publication,|| he described the pharyngeal tonsil more particularly, and proposed that name for it.

Henle¶ spoke of depressions and blind dilations in the mucosa, little cavities here and there to be found in the mucous membrane of the naso pharynx. He admitted the existence normally of Mayer's "Bursa Pharyngea." Such a conception led much later to the exaggeration by Tornwaldt of these occasional pathological conditions into a constant factor in the etiology of post nasal catarrh, his configuration of the tissue being still known under the name of "Tornwaldt's Disease"**. While it is possible that the cases observed by Loewenberg†† and more probably the cases observed by Voltolini‡‡ were really adenoids, this does not detract in the slightest from the originality of Wilhem Meyer's great clinical discovery.

* *Traite Pratique des Maladies du Larynx*, par. Dr. Ch. Fauvel, 1876.

† *Med. Record*, 1876, p. 359, Vol. XI.

‡ *Trans. Path. Soc.*, London, 1868, p. 65.

§ "Die Anatomie des Menschen." *Der Hals*, Bd. I, p. 210, 1862.

|| "Der Schlundkopf des Menschen," V. Hubert, V. Luschka, 1868.

¶ *Handbuch der Systemat. Anat. des. Menschen. Die Eingeweidelehre*, p. 83, 1866.

** *Ueber die Bedeutung der Bursa Pharyngea*, 1885.

†† *Archiv. f. Ohrenheilk*, 1867, p. 116, Vol. 2.

‡‡ *Die Anwendung der Galvano-Kautistik*, etc., 1867, p. 66.

Wagner in 1865* had described the anatomical structure of what he called "Pharyngeal Granulations."

Wilhelm Meyer had reported his observations on this lymphoid hypertrophy, in Copenhagen, in 1868, and later published in London† his paper "On Adenoid Vegetation in the Naso-Pharyngeal Cavity." It is difficult to find, in the annals of medicine, a first report of a morbid process which so thoroughly in one essay exhausts the subject from almost every point of view. So common that, after his attention had been drawn to the condition, he was able to detect it in 102 cases in eighteen months, with symptoms so characteristic that the veriest tyro in medicine now easily suspects their presence at a glance, with certainty of relief so quickly afforded by a simple surgical procedure, it certainly seems marvelous that the condition should have been so long undetected. The practice of post-rhinotomy had failed to reveal it. Notwithstanding that Czermark and his followers for ten years had been accustomed to explore by vision the cavity of the upper pharynx, it was left to an observer comparatively unfamiliar with post rhinotomy to detect it with his finger. In seeking for the cause of an eustachian catarrh in a patient he pushed his finger above the velum palati and thus became aware of a morbid growth, the removal of which has alleviated as much suffering and prevented as much disablement, as any surgical procedure which was ever devised by the wit of man. Not only by his thorough exposé of the whole subject did Wilhelm Meyer thus confer an inestimable boon on suffering humanity, but he has furnished a subsequent generation of rhinologists with their most lucrative source of income. No other event since the discovery of the laryngoscope has so contributed at once to the glory and the profit of the specialty of laryngology. With much more reason than Tagliacozzi's contemporaries and followers gazed upon his statue in Bologna, may the modern rhinologist and his patient alike, with unstinted reverence, view the figure of Wilhelm Meyer, as it stands, erected by them in 1898, in the "Gefion Platz" in Copenhagen. While only five cases had been previously noted, and while Waldeyer and his followers have subsequently further elucidated the histology of lymphoid hypertrophy, nothing of vital importance remains to be said of the history of "Adenoids" after Wilhelm Meyer.

It seems at first glance somewhat strange that the study of nasal disease should not have more attracted the attention of physicians even before the discovery of the laryngoscope. Nasal operations had

Wilhelm
Meyer.

* Archiv der Heilkunde, p. 318, 1865.

† Medico-Chirurg. Transactions, 1870, Vol. 53.

been performed, as we have seen, since the beginning of medical annals. The Hindus, Hippocrates, the Arabians, Aranzi and his followers, were accustomed to perform anterior rhinoscopy, and one would naturally think some device would have been adopted for the efficient illumination of the internal nose. We have seen that Hippocrates used a canula for intranasal cauterization, and one wonders that this did not sooner develop into a nasal speculum.

Nasal Specula

Guy de Cauliac referred to a device of Haly Abbas which we have noted, a "speculum ad Solem," which may have been used for dilating the nostrils, but from certain passages in the Arabian authors as well as in his own works, I can not but suspect that this old master surgeon of the Middle Ages misinterpreted his perhaps faulty transcript of the original manuscript. Recent scholarship* has unearthed a significant passage in the works of Arnold of Villanova (1240-1313). If one will turn to the place indicated†, one will find the author describing very carefully and minutely the symptoms of leprosy and the physical appearances of the face, eyes, etc., in these cases. He then goes on to say: "Likewise they are to be known from the wound (ulcer) existing in the nostrils, and these should be examined more deeply; for which purpose one should take a *small bifurcated branch of wood like a forceps*, and this should be placed in the nose, opening it, and one should look in with a lighted candle and if ulceration or excoriation is seen well in the depths of the nose, that is a reliable sign of leprosy and one which will not be recognized except by the well instructed." It is plain, therefore, that one of our modern forms of nasal specula was formed from the fork of a tree branch by the doctors of the Dark Ages, and we incidentally receive another hint as to obscurity in the differentiation of disease.

From time to time in the works on surgery mention may be found and some illustration noted of nasal specula, chiefly devised for protecting the nose from the incandescent iron. Thus Garengot‡ pictures a speculum nasi through which hot cautery irons may be thrust to sear the os unguis in order to destroy it. "Ainsi voila son usage expliqué." Dionis in his work on surgery§ depicts an instrument which is still occasionally called by his name, and is, in metal, practically the counterpart of the device of Villanova in wood.

* Archiv. f. Laryngologie, Bd. XI, Heft, 3, p. 482.

† Opera Arnaldi de Villanova, 1509, f. 204, Signa Leprosorum.

‡ Traité des Instruments, Tome II, p. 12.

§ Edit. 1716, p. 479, Fig. xxxvii, E.

We have reviewed the separate works of Deschamps, Cloquet and Piorry, on the nose, and have seen that knowledge of intranasal disease was fully abreast if not somewhat in advance of the knowledge of laryngeal disease up to the time of the fruitful labors of Czermak and Türck. The next fifteen years were almost exclusively devoted to the development of the knowledge of laryngeal morbid conditions as revealed in the laryngoscope, and to the technique of operative interference. In the first edition of Solis Cohen's book on Diseases of the Throat in 1872, containing more than 200 pages, scarcely 90 are devoted to diseases of the nose. In 1879 twenty pages were added in the second edition, but little or nothing of this extra space was devoted to the nose. A reference to any one of the recent text books, Lennox Brown's last edition for instance, will show that the proportion has been more than reversed in the thirty years of the active evolution of our knowledge of the normal and abnormal states of the upper air passages. In the first edition of Cohen's work, just referred to, the 90 pages are taken up with a consideration of Epistaxis, Coryza, Ozæna, the nasal douche, Anosmia, foreign bodies, nasal polypi, for the removal of which the use of the nasal forceps was still advised. He does little more than refer to affections of the accessory sinuses. Spencer Watson and Michel, in 1875, published brochures on diseases of the nose, the latter being translated into English by Shurly in 1876, but it was after 1880 that the impulse to the more exhaustive study of intranasal phenomena began, and in another ten years the number of journal publications dealing with the nose and naso-pharynx had already exceeded in number those referring to the larynx and air tubes. Notwithstanding the enormous increase in all departments of the literature of our specialty, this discrepancy has continued to gradually become more marked*.

Neglect of Nasal Disease.

Revival of Interest in Nasal Disease.

The first marked evidence of this awakening to the importance of nasal phenomena may be seen in the history of the interest aroused in reflex nasal neuroses. Certainly no other subject was so calculated to stimulate inquiry into all manner of nasal lesions. How grossly, after a few years, this subject was exaggerated and distorted is apparent, now that the exaggeration is decreasing. Notwithstanding the fact that John N. McKenzie† has pointed out that spasmodic affections of respiration had been noted by Coelius Aurelianus, Galen and many other subsequent writers in the prae-rhino-

Reflex Neuroses.

* A reference to the summary of the literature in the first issue of each year of Semon's *Internationales Centralblatt für Laryngologie* will make this evident.

† Trans. Am. Lar. Ass'n, 1886-7.

scopic era, Voltolini* was the first to note the phenomena at a time when the local conditions in the nose could be carefully studied by actual inspection. Voltolini drew attention to the intimate connection between asthma and nasal polypi, and asserted that he had seen the asthma disappear on the removal of the polypi. He referred the idea of reflex action from the irritation of the mucosa back to the physiology of Johann Müller, and we have seen the matter discussed in the lectures of Marshall Hall, in 1836. The beginning of the development of our knowledge of the erectile tissue in the nose, dates back to the brief paper of Kohlrausch,† who, in 1853, spoke of the cavernous tissue of the nasal mucosa, especially of the posterior border of the inferior turbinated bones, which we have seen Morgagni had described as of a glandular nature. Although Kohlrausch seems to have had the right conception of their essential nature, his methods of demonstration were very crude. Scarcely less superficial were the plates of Bigelow, in 1875,‡ who was misled somewhat, apparently by having blown air into the submucous tissues, and regarding these emphysematous spaces as blood channels. He, however, pointed out more intelligently the structure and erectile nature of this tissue. Both Kohlrausch and Bigelow refer to Hyrtl as having previously noted this cavernous condition of the mucosa, but I am unable to find anything more than a cursory reference by him to the vascularity of the mucosa in this situation.§ It remained for Zuckerkandl,|| whose work may be profitably consulted for a much fuller history of the subject, to more completely and satisfactorily elucidate the real structure. The evident dependence of the congestion of this erectile mucosa upon reflex action connected it, not only with the neuroses of hay fever and asthma, but with the histological changes in the stroma. A perusal of the subsequent literature will again reveal the process of differentiation in nasal affections, as we have so frequently had occasion to note in the course of this history. Schaeffer¶ had drawn attention to local disease of the upper air passages as an exciting cause for asthma and other neuroses, but it was not until the publication of W. Hack's** paper on "Reflex Neuroses," in 1882, that the attention of laryngologists was arrested. There followed a large number of contributions to medical literature by

* Die Galvano-Canstik, 2te Aufl., 1872.

† Müller's Archiv. f. Anatomie, Physiologie, etc, 1853, p. 149.

‡ Boston Medical and Surgical Journal, April 29, 1875, No. 17, p. 489.

§ Vid: Hyrtl's Topographische Anatomie, Ed., 1847, Bd. I, p. 212.

|| Normale und Patholog. Anah. der Nasenhöhle, Bd. I, 2te Aufl., 1893.

¶ Deutsche Med. Woch., Nos. 32, 33, 1879.

** Berl. Klin. Woch., Vol. XIX, 1882, p. 379.

Elsberg,* John N. McKenzie,† Roe, Daly, Bosworth, and many others. They elaborated this chapter in laryngology to an extent which now seems overdrawn, much more prominence being given to local conditions than to the underlying systemic neurosis in the etiology.

This immediately stimulated an interest in intranasal surgery, and no one can now deny that, for a while, the nose was a much abused organ. Chronic hypertrophy of the mucosa was perhaps the lesion which first attracted the chief attention. We have seen that the treatment of nasal obstruction, due to hypertrophy of the mucosa, by means of nasal bougies, had been recommended by Deschamp and Cloquet in the beginning of the century, and we find this method again proposed in America at the beginning of the development of modern rhinology.‡

Intranasal
Surgery.

The application of acids which we have seen in the records of ancient medicine, was one of the sheet anchors of intranasal therapy, but later was much neglected. Now it sprang suddenly into favor, some of the weaker acids, such as chronic or chloracetic, being found preferable to the painful action of the stronger mineral acids. Soon, however, these caustic applications give place in a large extent to the actual cautery, a still older therapeutic measure, as we have seen in the Hippocratic treatises, but now the hot metal, by means of the electric current, brilliant illumination, and cocaine, had become much more manageable in its application. The introduction of this method of cauterization goes back in prae-laryngoscopic times to the work of Middeldorpf, who in 1854 published§ illustrations of a cautery armamentarium practically the same with which we are now familiar. Voltolini in 1867 (l. c.) further developed the technique by the aid of laryngoscopy. He also was the originator at this time of electrolysis in various affections of the nose and throat. The improvement in the source of the electric discharge soon brought the method of galvanic cauterization into universal use. An ingenious operation frequently needs only the recommendation of novelty, and Michael's amusing little poem entitled "Rhinologie," read at the International Congress of 1890,|| shows that even by that

Caustics and
Cautery.

* Trans. Am. Lar. Ass'n, 1883, p. 79.

† Am. Jour. Med. Sc., July, 1883.

‡ In a report of the proceedings of the New York Laryngological Society, we find Asch, Wagner and Smith advising the use of intranasal bougies, in hypertrophy of the inferior turhinated bone. N. Y. Med. Jour., Vol. XIX, 1874, p. 422.

§ Die Galvano-Cautic, von Albrecht Theodor Middeldorpf, 1854.

|| Vid. Centralblatt f. Lar. VII, p. 133.

time intranasal cauterization was becoming a little ridiculous. For almost every affection of every organ, from the uterus to the eyes, after the spread of Hack's ideas,

"Dann wird die Nase ausgebrannt,
Denn das hilft immer wie bekannt."

The Dental
Engine.

Other methods of removing intranasal obstruction came rapidly into use. The dental engine seems to have first been used by Solis Cohen.* He destroyed an exostosis of the nasal passage by this means in 1878. Seiler seems to have been the first to suggest the use of the electro-motor for driving the dental engine in this operation†. After the introduction of this adjuvant, the apparatus became a part of the armamentarium of every laryngologist, at least in America, though much later in Europe. In 1887 Bosworth reported his invention of a nasal saw for septal ecchondroses‡ and this method of their removal was so practical that its performance immediately became very common.

The Nasal
Saw.

The Nasal
Snare.

We have already followed the history of the nasal snare down to the 19th century, and we have to note one more reproduction and modification of Hippocrates' loop, before we reach the Jarvis Snare. It is that of William Robertson§. He used harpsichord wire which however did not run through a canula but through lateral guides at the side of a steel post.

Jarvis' chief improvement|| over the snare of Fallopius consisted in the method of drawing the wire through the canula. He made use of an outer canula at the distal end for the attachment of the wire and the adjustment of the milled nut to a screw thread on the inner canula, by the use of which the loop could be powerfully, accurately, and slowly tightened. This immediately made the nasal snare the most efficient instrument for the removal of soft intranasal tissue, and the numerous subsequent modifications testify to the fact.

All this activity and zeal for the removal of intranasal tissue would have been very much less had it not been for the epoch making discovery, by Carl Koller in 1884,¶ of the surgical possibilities of cocaine. The three greatest events in the history of Modern Laryngology and Rhinology are the demonstration of the utility of the laryngoscope by Czermak and Türck, the observation of adenoids by Wilhelm Meyer, and the advent of cocaine. Its use in laryngology was introduced by Jelinek.** The impunity, so far as

Cocaine.

* The Medical and Surgical Reporter, July 13, 1878, Vol. 39, p. 30.

† Diseases of the Throat, Edit. 1883, p. 248.

‡ Medical Record, January 29, 1887.

§ Edinburgh Medical Journal, Vol. I, 1805, p. 410. Fig. p. 404.

|| Trans. Am. Lar. Ass'n., 1880, p. 130.

¶ Wiener Med. Woch., 1884, No. 43, p. 1276, seq., N. Y. Med. Journal, January 3, 1885, p. 19.

** Wiener Med. Woch., No. 45, 1884, p. 1332.

pain is concerned, with which the mucous membranes of the nose and throat may be burned and lacerated, has done perhaps more than anything else towards the development of the technique of laryngology. A merciful Creator having invented pain for the protection of the tissues of the animal world, its abolition by the ingenuity of man has been necessarily followed by much ruthless and unjustifiable destruction of them, but nevertheless among drugs cocaine ranks only second to the general anaesthetics in the mercies vouchsafed to the human race.

Inhalations.
and Deter-
gents.

When we seek the origin of the local topical treatment of catarrh of the upper air passages by detergents we are immediately transported far back into the misty records of Hindu medicine, and the same may be said of inhalations. We need not trace these through the intervening ages, but, after the incidental references which have found their way into the foregoing pages, I am sure the reader will not regard the taunt of the Frenchman altogether without its sting. "Tout ce que les m^edecins modernes ont fait pour guerir le rhume de cerveau, ç'a été, de l'appeler Coryza." Had he been familiar with medical history, he would not have been ready to concede us even that meagre praise.

The compressed air spray seems however to have really been an invention of a comparatively recent date, but we are compelled to seek distant fields for the history of the actual inception of that idea. Galen is said to have prophesied we would some day succeed in isolating the Pneuma in the atmosphere which is taken into the blood in respiration. We have noted the observations by Lower and Mayow in the 17th century. Priestly, in actually isolating oxygen from other substances, scarcely knew more of it, still terming it Deplogisticated Air, than did his predecessors in the 17th century,* but the time was ripe for its elucidation, which quickly followed under the admirable and accurate experimentation of Lavoisier. He was the first to give it the name of Oxygen† in 1777. This very soon aroused great interest in the gas as a medicinal agent, and devices were adopted for its inhalation by Beddoes and Watt in 1796.‡ Some years before this John Mudge§, knowing nothing of the pulmonary residual air, nor of the ciliated epithelium advised the inhalation of steam, combined with opium, with the idea that the medicament would thus reach the ultimate bronchioles. His apparatus was very much like

* Priestly: "Experiments and Observations on different kinds of air."—London, 1775.

† Comtes Rendus de l'Academie des Sciences, September 5, 1777.

‡ Considerations on the Medicinal Use and on the Production of Fictitious Air, 1796.

§ A Radical and Expeditious Cure for a Recent Catarrhus Cough, 1782.

the present croup kettle with a flexible tube. When Davy announced the existence of residual air in the lungs the significance of it was immediately appreciated by Majendie, who comprehended the impossibility of thus applying medication to the ultimate ramifications of the pulmonary tree.

The Compressed Air Spray.

The idea of the use of sprays in the air passages seems to have originated at one of the French baths. Some apparatus for spraying the body had been in existence for some years when it occurred to Dr. Auphan, in 1849, to utilize it for inhalation. Sales-Girons succeeded in inventing a portable apparatus for the purpose. It was a very awkward affair, somewhat on the principle of some of the present inhalation globes. A fine stream was broken into particles by being thrown with force against a concave surface. Mathieu, Bergson, and others improved this somewhat, and finally the latter conceived the idea of breaking the stream of water into a spray by a blast of air or steam blown across its exit from a narrow tube. This of course necessitated the employment of compressed air. This ingenious invention, under various names and modifications, was received with great enthusiasm by the budding specialty of laryngology. The mucous surfaces were deluged with all sorts of drugs suspended in watery and oily media. The futility of much of this sort of therapy has gradually become apparent, but since the introduction of antiseptics it has found its place in laryngological practice, not its least virtue consisting in impressing the patient with the resources and skill of his doctor. At first attempts were made to use warm sprays, but as early as 1861, Demarquay* drew attention to the fact that watery sprays have approximately the same temperature after they are nebulized, whatever may have been the previous temperature of the fluid. I find the use of nebulized sprays first recommended in America by Solis Cohen in 1866†.

Improvements in Illumination.

Besides the great strides made in operative technique, fewer advances have been made in the art of Rhinoscopy and Laryngoscopy itself. Intensification of illumination was obtained in the early history of laryngoscopy by the use of the oxy-hydrogen lime light, the idea beginning, as we have seen, with Voltolini, while in Fauvel's book‡ the more perfect apparatus of Drummond was recommended for the purpose. French has used Aranzi's idea, a ray of light

* Bulletin de l'Academie Imperiale de Medicine T. xxvii, 1861-2, p. 26.

A fuller account of the history of sprays may be found in Lewin's book, "Inhalations Therapie," to which I am indebted for some of the above information.

† New York Medical Record, p. 147, 1866-7.

‡ Traité Practique des Maladies du Larynx, 1876.

reinforced by a water lens, and found the best illumination in the rays of the sun thus intensified. His application of the arc light to the purpose is also very efficient, he having adopted both these expedients in his photographs of the larynx and naso-pharynx.* Turck† and others had attempted to magnify the laryngoscopic image by means of lenses and concave mirrors, and Hirschberg,‡ later, attempted the same thing. These attempts have proved of no practical value. By means of stroboscopy, Oertel,§ in 1878, showed the wave lines of different tones in the vibrations of the vocal cords.

Transillumination of the tissues, which had been suggested by Voltolini, was applied to the examination of the accessory sinuses, in 1887 and the following years, by him and many others, when diseases of those cavities began to attract more careful study. The electric lamp has made this original idea of Voltolini a valuable aid in rhinoscopic diagnosis. Lastly, we have to note the method of Kirstein, of direct inspection of the larynx, which promises to be, however, of very limited application,|| and one which had already been, to some extent, anticipated again by Voltolini, in 1872.¶ Indeed, to Voltolini is to be attributed a much larger proportion of original ideas in the development of the specialty of laryngology than to any other one man. In this fertility of resource he scarcely has had a rival in the history of our subject.

Transillumination.

THE PROBLEMS OF THE PRESENT.

To pursue our history further we must enter the present era, and deal with matters to which it is at present impossible to give the proper historical perspective. Nevertheless some account, which must necessarily be very incomplete when compared to special monographs, must be given of questions still under active debate, especially in their earlier development.

LARYNGEAL PARALYSIS AND THE INNERVATION OF THE LARYNX.

While the literature of the innervation of the larynx goes back to Galen, and of this we have given some account, the history of laryngeal paralysis can hardly be pursued with profit in the

The First Report.

* Vid. Trans. Am. Lar. Ass'n, 1882, 1883, 1886, 1888, 1896.

† Zeitsch. der K. K. Gesell. der Aerzte zu Wien, No. 52, 1859, p. 817.

‡ Virchow's Archiv., 1877, No. 69, p. 146.

§ Centralblatt f. die Medicin. Wissenschaft, 1878, p. 99.

|| Berl. Klin. Woch., 1895, No. 22.

¶ Die Galvano-Caustik.

prae-laryngoscopic era. According to Semon* Traube was the first to give an account† of the laryngoscopic image in a case of laryngeal paralysis. The condition was due to pressure of a thoracic aneurism on the recurrensts, but the diagnosis of the lesion in the chest was not made at such an early date as this by means of the laryngoscope, which in later years has become so valuable an adjuvant to other methods of physical diagnosis in the differentiation of the condition.

Türck declared‡ that in 1859 he had already reported a case, but the interpretation of his reference leaves the matter in some doubt, though in the next year he described§ immobility of the left vocal cord in a case of right hemiplegia. Lewin in the same year gave a good description|| of paresis of the muscle of the right arytenoid cartilage, "which narrows the glottis, and does not produce hoarseness," in a patient suffering from constitutional syphilis, evidently a case of posticus paralysis. Mandl gave an early but rather confused account of the subject in France,¶ and reported a number of poorly differentiated cases, including, however, some of functional disturbances.

We find him using the term laryngeal epilepsy, but not in the sense subsequently employed by Charcot. Türck,** we may note, interpreted a case of what was apparently hysterical aphonia as spasm of the crico-thyroid muscles. Gerhardt was the first to begin the intelligent differentiation of laryngeal paralysis according to their lesions.†† Bäumlert‡‡ and Johnson||| showed that a unilateral affection of the vagus may, under certain circumstances, produce a bilateral paralysis of the vocal cords, or paralysis on one side and spasm, as he belived, on the other. In America, in 1869, F. I. Knight reported§§ three cases of laryngeal paralysis. At first cases of functional paralysis, chiefly hysterical, were con-

*"The Study of Laryngeal Paralysis since the Introduction of the Laryngoscope."

For a fuller account of the subject see this exhaustive bibliography. See also the review of the subject by myself; Two Cases of Laryngeal Paralysis; N. Y. Med. Jour., Sept. 28, 1889. The literature of the subject may be also studied in a monograph by Burger, "The Laryngeal Troubles of Tabes Dorsalis, 1891."

† "Laryngoskopischer Befund in einem Fall von Aneurysma des Aortenbogens; Deutsche Klinik," No. 27, P. 263, 1861."

‡ Klinik der Krankheiten des Kehlkopfes, etc., 1866, P. 443.

§ Allg. Wien. Med. Ztg. No. 9, 1860.

|| "Ref. Schmidt's Jahrb.," No. 108, P. 99, 1860.

¶ "Des Neuroses Chroniques du Larynx," Gaz. des Hopitaux, No. 4, 1861.

** "Allg. Wien. Medizin Ztg.," No. 8, 1862-70.

†† "Virchow's Archiv.," 1863, Bd., XXVII., P. 68, 296.

‡‡ "Deutsches Archiv. f. Klin., Med.," No. 6, P. 550, 1867, Trans. Path. Soc. of London, Vol. 23, P. 66.

||| "Trans. Path. Soc." London, Vol., 24, P. 42.

§§ Boston Medical and Surgical Journal, Feb. 25, 1869, P. 49.

founded with those of an essential lesion, as we have noted in the reports of Mandl and Türck, and there is consequently much confusion in the earlier papers on the subject, as for instance those of McKenzie* and Cohen.† In 1870 Gerhardt contributed another valuable paper‡ to the literature of the subject, in which he introduced the term “cadaveric” position of the vocal cord, to indicate its situation in total laryngeal paralysis, a term to which of late there has justly been made objection as being inaccurate. This paper much advanced the clinical knowledge of the subject. In the same year appeared another important paper§ by Riegel, who pointed out the distinction between respiratory and phonatory paralysis.

“Cadaveric
Position.”

Schech|| and Schmidt¶ did much to formulate the arrangement of laryngeal innervation and muscular movements given by the text books, and accepted up to the date of the Rosenbach-Semon “law” and the Krause controversy, as to the nature of the cases of median position of the cord. W. W. Keen** in 1875 performed some experiments by faradization of the recurrent laryngeal nerves in a recently hanged man. Notwithstanding the attention which had been given to the matter, our knowledge of the subject was still in a very unsatisfactory state for many years after the laryngoscope had made observers familiar with the local appearances.

Such an eminent authority as Störk had, as late as 1880,†† declared that paralysis of the potsici muscles was one of rarest of laryngeal neuroses. Some cases had been reported previously by Von Zienssen, Bosworth and others, but the subject of bilateral paralysis of the abductors was more carefully described in 1878 by Semon.‡‡ He pointed out in the german edition of Morell McKenzie’s book (1880) in a foot note the greater proclivity of the abductor filaments of the recurrent nerve to injury from disease or trauma. This was further elaborated by him in a paper published§§ in 1881. About the same time Rosenbach drew attention to the same phenomenon.||

Greater Pro-
clivity of Ab-
ductors to
Paralysis.

* Hoarseness, Loss of Voice and Stridulous Breathing in relation to nerve and muscle affections of the Larynx, 1868.

† Diseases of the Throat and Nasal Passages, 2d Edit., 1879.

‡ Ueber Diagnose und Behandlung der Stimmbandlähmung, Volkmann’s Sammlung Klin., Vorträge No. 36 (Inn. Medizin, No. 13), 1870.

§ Ueber Respiratorische Paralysen, Volkmann’s Vorträge, No. 95 (Inn. Medizin, No. 33), 1870.

|| Berl. Klin. Woch., No. 20, 1873.

¶ Ibid., No. 3, 1873.

** Trans. Coll. of Phys. of Philadelphia, 1875, Vol. I., P. 97.

†† Klinik der Krankheiten des Kehlkopfes, 1880, P. 380.

‡‡ Trans. of the Clin. Soc. of London, Vol. XI. P. 141 ff.

§§ Archives of Laryngology, Vol. II. No. 3, 1881.

|| Breslauer Aertzl. Zeitschrift 2, 3, 1880.

They established the fact, which has been occasionally known as Semon's "law," that when one laryngeal muscle alone is affected it is usually the abductor, the crico-arytenoidens posticus.

About this time Elsberg* noted that, although other muscular groups may recover with varying rapidity and completeness from paralysis, the power of the laryngeal muscles rarely returns.

The Contracture Theory.

Krause† attempted to invalidate the conclusions of Semon by advancing his theory of contracture. Many subsequent writers accepted the views of Krause. They claimed the contracture either with or without paralysis of the abductors was due to stimuli of various kinds, irritating either the nerve trunks or their cerebral centers. This idea had been advanced by Jeleneffy‡ in 1872, and was further elaborated by him in 1888. In 1875 Johnson§ had advanced an explanation to account for bilateral paralysis, due to pressure on one recurrent alone, which he believed was due to the ascending degeneration and involvement of the chiasm in the brain.

A vast amount of experimentation upon animals revealed variations in the effects produced by different strengths of the electric current applied to the recurrent nerve. These effects varied also according to the degree of anæsthesia produced.

These observations were brought out chiefly in the papers of Donaldson|| and Hooper.¶

The literature of the subject at this time grew to great proportions. The most important of the contributions which combated the views of Krause were perhaps those of Semon and Horsely** and of Risien Russell.†† The latter showed that the abductor and adductor filaments existed in the recurrent nerves each as separate bundles of fibres. This was also simultaneously announced by Onodi. So many aspects of the question of laryngeal normal physiology and pathology are still unsettled, that a critical and historical survey of the subject would not be satisfactory. Suffice it to say that after many years the contention of Semon and his school seem to have gained the ascendancy, and it is now supposed that median position of the vocal cord usually signifies some interference with a separate nerve tract either in the recurrent nerve or its cerebral origin.

*Philadelphia Med. Times, July 30, 1881.

†Virchow's Arch. No. 98, 1884, P. 294.

Ibid No 102, 1885, P. 301

Arch. f Physiologie, 1884, P. 566.

IBerl. Klin. Woch. No. 26, 34 seq. 1888.

‡Trans. Med. Chir Soc., London, 1875, Vol. LVIII, P. 29.

§Am. Jour. Med. Sc., July, 1886.

¶New York Med. Jour., July 4 1885.

**Brit Med. Jour., Dec. 21, 1889. Phil. Trans. Royal Soc., London, Vol. V., 181.

††Proceedings of the Royal Soc., Vol. 51, 1892, P. 102.

The central innervation of the larynx was also developed, *paripassu* with the controversy in regard to the phenomenon of posticus paralysis. While Ferrier* had in 1876 made some allusion to the phonatory movements of the larynx on cerebral excitation, and while Duret† had noted that the destruction of a convolution in front of and below the sigmoid gyrus abolished the power of barking in a dog, Krause's paper,‡ in 1884, was really the first of a series of many others, among them especially that of Semon and Horsely (l. c.), which has developed our knowledge of the cerebral center of laryngeal innervation.

The Central
Innervation
of the
Larynx.

LARYNGEAL CANCER AND ITS EXTIRPATION.

I have already traced with some care the history of laryngeal growths and the operations for their removal up to the time of the perfection of the technique of the intra-laryngeal operation. It soon became apparent that the latter could not be extended with satisfactory results to malignant growths, especially at a time when their differentiation at an early stage was still undeveloped. We find, therefore, that at an early stage in the development of laryngoscopic diagnosis, intra-laryngeal procedures for their removal did little more than aggravate the local condition, and very soon such attempts were, for the time at least, all but abandoned.

We have noted records of the opening of the wind-pipe for a foreign body a hundred years before, and although this had been occasionally repeated, it was not until 1834 that the operation was first done by Brauers§ for a laryngeal polyp. Ten years later, Ehrmann (l. c.) again operated, supposing that it was the first time the operation had been performed for relief from a polyp. A preliminary tracheotomy had been performed; aphonia resulted, but the operation was otherwise a success, the patient dying subsequently from typhoid fever without recurrence. In 1865 H. B. Sands reported|| an external operation as having been done in 1863 for laryngeal cancer which had been diagnosticated by laryngoscopy. The patient died within a year. Sands was at that time able to collect reports of eleven thyrotomies and thirty-nine intra-laryngeal operations for growths in the larynx. In the following year Cabot¶

Laryngotomy.

*The Functions of the Brain.

†Etudes Experimentales et Cliniques sur les Traumatismes Cerebraux, 1878.

‡Ueber die Beziehung der Grosshirnrinde zu Kehlkopf und Rachen. Arch. f. Anat. und Physiologie, Pysiol. Abth., P. 203, 1884.

§ The case is referred to by Albers in Graefe und Walther's Journal, Bd. XXI, 1834, P. 534.

|| New York Med. Jour., May, 1865, P. 110.

¶ Boston Medical and Surgical Jour., Vol. 74, P. 32, 1866.

reported an external operation for a laryngeal polyp. Balassa* in 1868 reported three cases, one each of papilloma, carcinoma, sarcoma, operated on by laryngotomy. He demonstrated that this could be done without necessarily a loss of voice.

Thus far operations for laryngeal cancer, external as well as internal, had been uniformly disastrous, some of the patients surviving the operation, but none being freed for any length of time from recurrence. It appears, from reference to a french thesis,† that A. M. Koeberle had suggested the possibility of total extirpation of the larynx in 1856. According to Foulis this was actually carried out successfully ten years later by Dr. Heron Watson for syphilitic disease. These facts, however, only came out later. Czerny‡, stimulated to experimentation by the report§ of a case of laryngeal tumor extirpated externally by Schrötter, who expressed a wish that laryngectomy were a feasible operation, demonstrated on dogs its practicability. On the 27th of November, 1873, Billroth performed the operation on a man|| with success. Heine¶ and Mass** repeated the operation in the following year. At this time Gussenbauer constructed his artificial larynx. Foulis reported†† his first case in 1877. Lange performed the operation in America in 1879,‡‡ and by 1881 Foulis had collected the reports of thirty-two cases of total and six cases of partial laryngectomy. He reported these statistics at the International Congress in that year.§§ The operation met there with sharp criticism. Two years later Butlin wrote a very complete treatise on laryngeal cancer|||, and in the same year Cohen, in a careful analysis,¶¶ collected and analyzed sixty-five cases of the disease, and at that time arrived at the conclusion that extirpation of the larynx did not prolong life in these cases.

After this papers on the subject became very numerous. In the year 1886 alone, those of Newman (1), Lublinski (2), Hahn (3), Baratoux (4), Fränkel (5), Gerster (6), Lange (7), Park (8), Semon and Butlin (9), do not by any means exhaust the list.

* Wien Med. Woch., No. 91, 92, 93, 1868.

† Hermantier: Ref: Rev. des Sc. Medicales, T. IX, P. 298, 1877.

‡ "Versuche ueber Kehlkopf Extirpation." Wiener Med. Woch., 27, 28, 1870.

§ "Beiträge zur Laryngoskopischer Chirurgie." Wien. Med. Jahrb., XVII, Bd. II, 1869.

|| Reported by Gussenbauer, Archiv. f. Klin. Chirurgie. XVII, 1874, P. 343.

¶ Ibid., 1876, P. 514.

** Ibid., 1876, P. 507.

†† The Lancet, Oct. 13, 1877.

‡‡ Archives of Laryngology, 1880, Vol. I, P. 36.

§§ Transactions, Vol. III, P. 251.

||| "On Malignant Disease of the Larynx." 1883.

¶¶ Trans. Coll. of Phys. of Phil., P. 353, 1883, April 4.

(1) Glasgow Med. Jour., Feb., 1886.

(2) Berlin Klin. Woch., Nos. 8, 9, 10, Feb., 1886.

(3) Berlin Klin. Woch., Nos. 4 and 49, 1887.

(4) Progrés Medicales, Nos. 13 and 15, 1886.

(5) Langenbeck's Archiv., XXXIV, Hft. 2, Feb., 1887, P. 281.

(6) Annals of Surgery, III, 1886.

(7) Ibid.

(8) Ibid.

(9) Brit. Med. Jour., Nov. 20, 1886.

Fränkel (l. c.) in that year reported the first successful intralaryngeal extirpation of a malignant growth and became a partisan of that procedure in selected cases. Semon and Butlin warmly advocated the preference of partial laryngectomy over total exsection, rejecting the latter as unjustifiable. Of late years these gentlemen have reiterated their views.

In January, 1887, the Crown Prince of Germany, afterwards the Emperor Frederick, began to suffer from the symptoms of laryngeal cancer. The unfortunate quarrels between his physicians are a part of the reminiscences of many comparatively young men. As yet the rancor cannot have all died out. It is therefore unwise here to more than refer to an incident, from which no one emerged with credit* except the unfortunate and illustrious patient.

The Emperor Frederick.

While in the published accounts of the microscopic findings† the impression received by many was that the growth was of a benign nature, the subsequent course was one of malignancy to which this very estimable prince succumbed shortly after he became emperor.

The eyes of all the civilized world for months searched the daily papers for the distorted and unreliable news of the progress of the fatal malady. Patients suffering not from cancer of the larynx, but from "cancrophobia," filled the waiting rooms of the laryngologist. Not only the lay mind in morbid horror had its attention fixed on the malady, but the scientific interest of medical men was absorbed in the study of many of the problems of the subject. The relative merits of the intra and the extra laryngeal operation for laryngeal cancer were warmly discussed in the society meetings and in the medical journals. The question of the pathogenesis of cancer was universally discussed. Its evolution from benign forms of growth was strongly urged. At the International Congress in 1881 Solis Cohen had said: "I am afraid that laryngologists sometimes convert innocent papillomata into epithelioma by protracted manipulation continued too long." Lennox Browne entertained the same opinion. Semon warmly denied such a result. He immediately recognized the fact that if this belief were generally entertained, and it had been suggested by several others, a death blow had been dealt to all intra-laryngeal surgery. He therefore, by the patient collection of an enormous number of reports‡ from clinical observers all over the world, thoroughly negatived the idea and thus rendered a great service to Laryngology.

Malignant Transformations of Benign Laryngeal Neoplasms.

* Frederick, The Noble: Morell McKenzie, 1888.
Die Krankheit Kaiser Friedrich des Dritten, 1888.
† Berl. Klin. Woch. 1887, June 20, P. 445.
‡ Centralblatt f. Laryngol. V. No. 3. Sep. 1888, seq.

Of scarcely less importance was the information as to the histology of epithelial growths brought out in the discussion aroused by this melancholy case. R. Virchow* reported on the pieces first removed from the larynx of the German prince that presented no evidence of malignancy. Later he wrote† on Pachydermia Laryngis in which he described the condition as a simple hyperplasia of the epithelium over the vocal processes. He laid down the dictum that there is a sharp line of demarcation between the benign epithelial hyperplasia and the stroma, and anything of an epithelial nature below this line and unconnected with it is at least of a suspicious nature.‡

In addition to the one which Semon's collective investigation settled, the questions brought into prominence by this case were:

1. The unreliability of a negative microscopical diagnosis in a case of suspected cancer.
2. The preference in the great majority of the cases of an external over an internal laryngeal operation.
3. The question quickly answered was, the necessity in all cases of an early diagnosis and a prompt operation in incipient cases.

Extirpation of the larynx rapidly became more common, and by 1890 Krause§ was able to cite 219 cases of extirpation of the larynx, 160 of which were total exsection and 142 of these were for cancer.

J. Solis Cohen, notwithstanding his former condemnation of the operation, at first suggested the removal of the soft parts within the larynx, leaving the cartilaginous framework, but subsequently reported|| a case in which the whole larynx and two rings of the trachea were removed, and the stump of the latter stitched to the episternal notch. The man survived and, though there was no communication between the pharynx and the larynx, he was able to articulate with distinctness by means of pharyngeal speech. The other alternative in these cases has been the insertion of a Gussenbauer prothesis.¶ Of late years total extirpation of the larynx for malignant disease has found favor in Germany and America, while a more or less incomplete laryngectomy has been the favorite operation of Semon and Butlin and the English operators.

*Berlin Klin. Woch. No. 25, 1887, P. 445. No. 28, 1887, P. 519.

† Ibid No. 32, S. 585, 1887.

‡ See Berl. Klin. Woch. No. 47, 1887, Virchow insisted that he had only reported on the character of the pieces submitted to him for diagnosis, when he reported the first pieces removed from the Prince's larynx to present no evidence of malignancy.

§ Allg. Wien. Med. Ztg. No. 15, 1890, P. 169.

|| New York Med. Jour., Nov. 12, 1892.

Jour. of Laryngology, July, 1892.

¶ J. Wolf; Deutsche Med. Woch., Nos. 3 and 33, 1892.

Berl. Klin. Woch. No. 21, 1892.

THE ACCESSORY NASAL SINUSES.

We have seen how completely and exhaustively the subject of the surgical treatment of the Antrum of Highmore had been dealt with in literature, largely before the 19th century. It has left little to add in the way of recording original advances since then, nearly all of even the latest procedures having been described in prae-laryngoscopic writings.*

After the beginning of the development of Modern Rhinology in the early eighties, interest was gradually aroused in the subject of accessory sinus disease. In the discussion at the meeting of the German Naturalists in 1886, the idea, traces of which we have seen in earlier literature, again arose as to the connection between sinus disease and ozænatous atrophic rhinitis. The etiology of maxillary sinus disease in the vast majority of the cases was at this time ascribed to carious teeth. Among those who accepted this view were Kilian,† Schmiegelow‡ and McBride.§

Mikulicz|| brought into vogue his operation of perforating the maxillary sinus with a trocar and canula from the nasal chambers, but the perforation through the alveolus still remained the more common procedure as long as the teeth were accepted as the chief factors in the etiology of suppuration.

At this time, also, Woakes drew attention¶ to the frequent coincidence of ethmoiditis and nasal polypus. Interest was soon aroused in America, and Dr. J. H. Bryan, in 1889, read a paper on the subject.

Considerable had been said as to the difficulty in diagnosing the presence of pus in the maxillary sinus, and the trocar of Krause was devised for exploratory puncture, irrigation, and the insufflation of iodoform and other powders.** Another method of diagnosis attracted much more attention. Dr. Theodor Heryng, in 1889, urged†† the idea of Voltolini—the electric transillumination of the antrum. McBride and Vohsen read papers on this subject at the International Congress in 1889. Lichtwitz‡‡ and Jeanty§§ wrote

Transillumination.

* There is an early American treatise, "Dissertation on the Diseases of the Maxillary Sinus," by Chapin A. Harris. 1843.

† Monatschrift f. Ohrenheilkunde, 10-11, 1887.

‡ Hospitals Tidende, Feb., 1888.

§ Edinb. Med. Journ., April, 1888.

|| Archiv. f. Klin. Chirurg., 3 Hft., 1887, XXX, P. 626.

¶ Nasal Polypus, 1887.

** Moritz Schmidt, Berl. Klin. Woch., No. 50, 1888, P. 1012. Friedländer, Berl. Klin. Woch. No. 37, 1889.

†† Berl. Klin. Woch., No. 35, 1889.

‡‡ Prager Med. Woch., 15, 16, 1892.

§§ Traité sur l'Empyeme latente, etc., 1891.

on the cases of latent suppuration in the Antrum of Highmore in 1890, '91, '92, pointing out that it was frequently bilateral. Writers became more cautious and critical as to the results of treatment. Many cases previously thought to be affections of the maxillary sinus were proven to have their origin at least in the other cavities. Bosworth, in 1891, wrote on the "Various Forms of Diseases of the Ethmoid Cells,"* and Grünwald published† a paper on affections of the frontal sinus. In the next year he published his well known work‡ on the diseases of the accessory sinuses, especial attention being directed to diseases of the ethmoidal and sphenoidal cavities. His radical views as to occurrence, complications and treatment produced a marked impression on rhinological observation and practice. Lichtwitz,§ in 1893, urged the practicability of reaching the frontal sinus through the nose by a canula, which has not been accepted as a judicious procedure by later writers.

During these years the invaluable|| work of Zuckerkandl was the guide of surgical procedure and the inspiration of much work in the pathology of these regions. In 1877 Schalle had described¶ a method of reaching, without disfiguration, the nasal and aural cavities in the cadaver, but Harke,** in 1891, introduced a more practicable procedure. Subsequently, in 1895-6, Harke,†† Dmochowski‡‡ and E. Fränkel§§ have added very greatly to our knowledge of the morbid anatomy, while Luc, Hajek and Bryan have still further elucidated the surgical, microscopical and clinical aspects of the subject in more recent years.

BACTERIOLOGY OF THE NOSE AND THROAT.

As in every other department of medicine, the sudden development of bacteriology had its effect upon the study of diseases of the upper air passages. Perhaps the effect was not so profound, because it soon became apparent that neither was there that urgent need nor was there a possibility of applying to the nose the rigid practice of antisepsis.

We can not here, as we have in many other questions, so profitably pass in review the history of our knowledge of bacteria. It be-

* New York Medical Journal, Nov. 7th, 1891.

† Münchener Med. Woch., No. 40, 41, 1891.

‡ Die Lehre von der Nasen-Eiterungen, etc., 1892.

§ Annales des Maladies de l'Oreille, etc., P. 132, 1893.

|| Normale und Pathologische Anatomie der Nasenhöhle, etc., 1882.

¶ Virchow's Archiv, 1877. No. 71, P. 206.

** Ibid. Bd. No. 125, P. 410.

†† Beiträge zur Pathologie und Therapie der oberen Athmungs wege, 1895.

‡‡ Arch. f. Laryngologie Bd. III hft. 3, 1895. P. 255.

§§ Virchow's Archiv. Bd. 143, hft. I, P. 42, 1896.

gan in 1675 with the first improvement in magnifying glasses by Leuwenhoek. It includes the interesting story of what is called the fallacy of spontaneous generation. Attacked time and again, first by Redi in 1668, and by Vallisneri before the discovery of infusoria by Leuwenhoek, and afterwards by Spallanzani in 1777, Virchow with his "Omnis cellula e cellula," and Pasteur and Tyndall have destroyed spontaneous generation in our day, but further discoveries, reaching back toward the great First Cause, will surely start it again, for our minds cannot be freed from the idea that there must be a time now, just as man has always believed there was once in the past a time, when what we call the animate was incorporated *de novo* with the inanimate. Hæckel and his school of Monists are denying that such a thing ever was or ever is, but as yet material science has not, in generation, got back of the cell and its nucleus.

Spontaneous
Generation.

The idea of the microbial origin of disease doubtless started as soon as the existence of infusoria was generally known, so eager has always been the search of etiology in medicine. Indeed, the following reference is in itself ample proof of it: "In 1721 the pest broke out at Marseilles and in the south of France. Antrechau attributed the contagious principle to infusorial animalcules." (Spr. V. 504). However interesting it would be to follow the growth of the idea, we must pass directly to the account of our knowledge of bacteria of the nose and throat. The presence of fungi, visible as they are to the naked eye when grown to large masses, was naturally the first to be noted.

In 1873 B. Fränkel* drew attention to the occurrence in the tonsil and pharynx of what we know as mycosis pharyngis. In 1882 E. Fränkel,† and many others since then, have elaborated the subject. In the same year (1873) Hueter‡ claimed that the micro-organisms observed in nasal secretions were the cause of coryza. It was not, however, until after 1880 that the literature of the subject became abundant. Herzog§ reported their presence in the normal nose. B. Fränkel, in 1886,|| demonstrated pathogenic cocci in the naso-pharynx. In 1889 Von Besser¶ and myself** were able to demonstrate their presence likewise in the nasal chambers of healthy people††

Mycosis
Pharyngis.

* Berl. Klin. Woch., 1873, S. 94.

† Zeitsch f. Klin. Med., 1882, Bd. IV, S. 288.

‡ Allg. Chirurgie, 1873, P. 257.

§ Wiener Med. Presse, 1881, No. 29, seq.

|| Berlin. Klin. Woch., 1886, No. 17, P. 265.

¶ Beiträge zur Path. Anatomie, 1889, No. 6, P. 333.

** N. Y. Med. Journ., July 27, 1889.

†† For an account of the discussion as to the presence of micro-organisms in the healthy nose see the paper "Nasal Bacteria in Health," by Dr. W.H. Park and Dr. Jonathan Wright, N. Y. Med. Journ., Feb. 5, 1893; Journ. of Laryngology, March, 1893; Ann. des Mal. de l'Oreille, Feb., 1893.

Atrophic
Rhinitis.

✓

The diseases with which the history of our subject is concerned, which have been profoundly affected in their nosology by bacteriological ideas are especially diphtheria and tuberculosis; but other affections have also been persistently ascribed to their influence. Atrophic rhinitis, accompanied, as it usually is, by the foul smelling secretions, very naturally fell under suspicion. Lowenberg described* in 1885 a bacterium constantly found in the secretions of ozæna and this has been many times confirmed by other observers since then. Klamman (1), Thost (2), Seifert (3), Strauch (4), Valentine (5), Hajek (6), Reimann (7), and others contributed to the bacteriology of ozæna within a few years after Lowenberg's paper, but the etiological importance of a bacterium, in spite of much recent literature as to other germs, has not been accepted as preponderating in the causation of atrophic rhinitis, and it can not be said that bacteriology so far has materially elucidated the mystery of the etiology and pathology of this disease. This is in striking contrast with the history of the diphtheria germ, the study of which has led to such astonishing results in pathology diagnosis and therapy, and in fact in biology in general.

Diphtheria.

So markedly are the symptomatic and prognostic features of that most frequent form of croupous inflammation of the mucosæ, associated with the presence of the bacillus, that all other forms are excluded from the term Diphtheria, which we have seen Bretonneau applying to the whole category. Looking back to the treatise of Bretonneau, we again see, as everywhere and always in medicine, that the progress has been one of advance in differentiation. We need not, therefore, review the abundant literature, which appeared in the long interval of nearly sixty years, which intervened between the work of Bretonneau and the discovery of the Klebs-Löffler bacillus.

Löffler,† in 1881, described more fully and identified more clearly the bacillus of diphtheria previously observed by Klebs. Roux and Yersin,‡ in 1888, still further extended our knowledge of the bacterium usually found in croupous inflammations, so that it became possible as it had previously been with tuberculosis to clas-

* Deutsch. Med. Woch., Nos. 1, 2, 1885.

(1) Allg. Med. Central Ztg., 67, 1885.

(2) Deutsche Med. Woch., No. 10, 1886.

(3) Volkmann's Vorträge, No. 240, 1884.

(4) Monatsch f. Ohrenheilk, 6 and 7, 1887.

(5) Correspond. bl. f. Schw. Ärzte, P. 141, 1887.

(6) Berl. Klin. Woch., No. 33, 1888.

(7) Inaug. Dissert. Würzb., 1888.

† Veröffentlichungen des Kais. Gesundheitsamtes.

‡ Ann. de l'Institut de Pasteur, 1888, '89, '90.

sify the disease from the standpoint of the bacteriologist rather than from that of the pathologist. But before this we find frequent traces of the belief in the germ origin of the disease. Thus Shurly in America in 1879* stated his belief in the microbial origin of diphtheria. Roux and Yersin began their studies on diphtheria in 1888 (l. c.), and continuing them for several years, they investigated the nature of the bacillus and its toxins, and laid the foundation for the production of the immunizing serum by Behring†, C. Fränkel,‡ and Roux and Martin.§

About this time attention was again drawn to that class of infectious disease of the tissues around the upper air tube of which Hippocrates had so much to say and of which Ludwig wrote (l. e.). Senator, in 1838, gave a very careful description|| of phlegmon of the peri-pharyngeal tissues, and numerous papers on the subject have subsequently appeared.

Phlegmonous
Pharyngitis.

If bacteriology wrought great changes in the nosology of diphtheria, intubation, as introduced by O'Dwyer, brought about no less a revolution in the operative treatment. Unknown to him, the idea, as we have seen, had existed in the very earliest records of medicine. It is a matter of conjecture how far Hippocrates introduced his tubes into the air-way, but that he passed these beyond the fauces is perfectly apparent. All through the history of medicine, especially before the Renaissance, and after the 18th century, the references are numerous to this Hippocratic manœuvre, but how often it was practiced is a matter of doubt, probably very infrequently. The first clear account of its use is in Bichat's description¶ of the operation as performed by Desault. He passed hollow sounds into the larynx, and gave temporary relief to a dyspnoic patient, as did also a distinguished surgeon of Toulouse, following his example. This was near the end of the 18th century. Bichat gives careful directions as to the technique. They were to be passed through the nose. While Desault and perhaps others were occasionally successful in affording relief by operations performed in this manner, the operation could not rival that of tracheotomy. The same criticism may be applied to the revival of the practice by Loiseau in 1840** and

Intubation.

* Trans. Detroit Med. and Library Ass'n, Feb. 1879, P. 13.

† Deutsche Med. Woch. Nos. 49 and 50, 1890.

Deutsche Med. Woch. No. 17 ff. 1893.

‡ Berl. Klin. Woch. No. 49, 1890.

§ Annales de l'Institut de Pasteur, No. 9, 1894.

|| Ueber Acute Infektiöse Phlegmon des Pharynx: Verhandl. der Berlin. Medil. Gesellsch. 1888, Bd. XIX, IIS. 10.

¶ Oeuvres Chirurgicales de Desault. Edit. by Bichat.

** Referred by him to this date in a communication published in Gaz. des Hopitaux, 1858, p. 491.

V by Bouchut who, in 1858, urged its use in the laryngeal stenosis of diphtheria.* The chief honor which Bouchut seems to have acquired was to draw the fire of his famous countryman, Trousseau, who had brought tracheotomy into greater vogue for the condition. Trousseau's predilection for the operation of tracheotomy, which he practiced with great frequency, no doubt had something to do with his unfavorable report on Bouchut's claims, but this predilection could not have arisen from the contemplation of his own results in diphtheria. They were atrocious. While, therefore, the idea had existed from hoary antiquity, and while during the preceding hundred years attempts were made from time to time to make it more practicable, there can be no question that success was first attained by Joseph O'Dwyer, who published first in 1885 the account† of his long, patient and persistent endeavors. The success which attended them is fresh in the minds of us all. The remarkable results attained of late years by the administration of antitoxin in laryngeal diphtheria has very greatly diminished the number of cases in which relief from dyspnœa in laryngeal diphtheria is imperatively demanded.

Tuberculosis.

We must now continue our study of the history of tuberculosis in the upper air passages. There can be no doubt that the recognition of the bacillus, as the specific agent of contagion, had very much to do with the stimulation of the hope of finding a cure for its manifestations in the upper air passages. Its recognition in the early part of this century, confused as it was with syphilis, was nevertheless enough for the formation of a hopeless prognosis. The differential diagnosis between syphilis and tuberculosis of the larynx was still very incomplete when laryngoscopy came into use. Notwithstanding the false idea of Louis, which Rheiners' contributions‡ had fostered, as to the frequent coincidence of catarrhal laryngeal ulcers with tubercular disease of the lungs, Türck's atlas and graphic descriptions§ in 1866 did much to familiarize observers with the varying appearances of syphilitic and tubercular laryngitis. Five years before this, Gerhardt and Roth had recorded their experiences in the observation of cases they called syphilitic disease of the larynx,|| but at that early date in laryngoscopy much confusion in the differential diagnosis is to be expected. In fact we very

* Bull. de l'Académie des Sciences, Nov. 1858.

L'Union Médicale, No. 130, p. 517, 1858.

† New York Medical Journal, p. 145 Aug. 8, 1885.

‡ Inaugural Thesis "Die Histologie des Kehlkopfs," 1852.

Virchow's Archiv., No. V, p. 534, 1853. Ueber den Ulcerationens im Kehlkopf.

§ Klinik der Krankheiten des Kehlkopfes, 1866.

|| Virchow's Archiv., No. 21, P. 7, 1861.

early find the observation of what is still supposed to be the combined form of syphilitic and tubercular laryngitis. Schnitzler wrote of it in 1868,* and subsequently returned to the subject with increased interest and wider experience in 1890.†

Mixed
Infection.

Virchow's remarks on tubercle threw a flood of light on the morbid processes in the lungs, and did more than anything else to dispel the confusion which reigned as to the pathogenesis of tubercle and its affinities to caseous degeneration. It seems wonderful reading, even forty years after it was written, that about the only gaps he left in the correct description of the pathogenesis of tubercle were those which later were filled by the discovery of the tubercle bacillus. He thus refers to laryngeal tubercle: "In the very frequent tuberculosis of the larynx, small, flat, clear, gray or whitish gray swellings are found, which hardly project beyond the surface."‡ He rejected, with Rokitsanski, the idea of Louis that laryngeal ulcers in phthisis pulmonalis are due to mechanical causes, and he declared the larynx is one of the best places in the body to study tubercle. In the matter of laryngeal ulceration he was not supported by Rindfleisch,§ who to some extent accepted the view of Louis. Ten years later we may note Bosworth maintaining the non-tubercular character and the curability of laryngeal ulcerations in phthisis.|| Schech,¶ in the following year, while admitting their occurrence, regarded them as very rarely simple catarrhal, but usually as tubercular. Krishaber, in 1881, while not reluctant to admit that laryngitis arising in a tubercular subject may become ulcerative without the morbid process having previously existed at that point, nevertheless recognized the tubercular form to be the usual one.** Perhaps the last important recrudescence of this attractive idea of Louis is to be noted in the monographs of Heryng,†† in 1884, who insisted that he had observed ten cases. Doubtless the entertainment of this belief had much to do with the subsequent enthusiastic manner in which he sought and claimed the attainment of a cure for tubercular laryngitis. At this time much interest was aroused by the discussion as to the question of the occurrence of a primary tubercular laryngitis.‡‡ Fränkel declared he had seen instances of it in which

Primary
Tubercular
Laryngitis.

* Wiener Med. Presse, No. 14, seq. 1868.

† Internationale Klin. Rundschau, No. 34, seq. 1890.

‡ Die Krankhaften Geschwülste, 1864, Bd. VII, P. 642.

§ Lehrbuch der Path. Anat., 1867-69.

|| Boston Med. and Surg. Journ., P. 544, April 17, 1879.

¶ Aertzl. Intelligenzblatt, No. 41. 1880.

** Trans. Internat. Med. Cong., 1881, Vol. III, P. 209.

†† Contribution à l'Étude des Erosions, dites Catarrhales.

‡‡ Vide. Trans. Internat. Med. Congress, 1881, III, P. 213.

pulmonary phthisis had later supervened. Voltolini doubted if this were actually the case. Krishaber declared he had never seen a case recover, but others were less skeptical, while Gerhardt thought catarrhal ulcers in pulmonary phthisis subsequently became tubercular. Shortly after this John N. McKenzie,* Schnitzler† and Percy Kidd described cases of non-ulcerative tubercular tumors of the larynx.

The Tubercle
Bacillus.

The contagiousness of phthisis had been asserted from time to time in the history of medicine, and Villemain had proved it experimentally in animals, but it remained for Koch, who had noted the spores of the anthrax bacillus, in 1876, to demonstrate the tubercle bacillus, in 1882. Immediately the diagnostic value of its identification in ulcers of the larynx was appreciated, though perhaps somewhat exaggerated, by Fränkel, in 1883,‡ in establishing their tubercular character. Much stress was also laid on this diagnostic value of the bacillus by Hunter McKenzie§ and Voltolini. || The latter however doubted the proof of its infectiousness in man.

Nasal
Tuberculosis.

Virchow had noted (l. c., P. 651) the occurrence post-mortem of nasal tuberculosis. Willigk had also observed it and in 1877 Laveran had spoken of a case of a nasal lesion he had observed which he supposed was tubercular, but Riedel seems to have been the first to report¶ well authenticated cases. Later Tornwaldt reported** a case, and Weichselbaum advanced†† the assertion, thus far unsupported, that the severe form of what he called scrofulous Ozoëna is dependent on miliary tubercle. He also pointed out the rarity of these cases. Cartaz,‡‡ Schaeffer§§ and Bresgen||| reported a number of cases in 1887.

Curability of
Laryngeal
Phthisis.

In the 17th century Marcellus Donatus¶¶ refuted the declaration of Galen that ulcers of the arteria aspera are easily cured. It was in 1886 that Heryng first asserted+ the possibility of the cure of tubercular laryngeal ulcers without special treatment. Subsequently×

* Archives of Medicine, 1882, P. 107.

† Wien. Med. Presse, April 1883, P. 446, Nov. 1884, P. 1397.

‡ Berl. Klin. Woch., Jan. 22, 1883, April 7, 1884.

§ Edinburgh Med. Journ. Feb. 1884.

|| Allg. Wien. Med. Ztg., 13, 14, 1884.

Monatsch f. Ohrenheilk, 3 and 4, 1884.

¶ Deutsche Zeltsch. f. Chirurgie, 1878, P. 56.

** Deutsche Arch. f. Klin. Med. No. 27, 1880, P. 586.

†† Volkman's Klin. Vorträge, 168-169. Allg. Wien. Med. Ztg. No. 27, 1881.

‡‡ La France Medicale No. 84, 1887.

§§ Deutsch Med. Woch. No. 15, 1887, P. 307.

||| Deutsch Med. Woch. No. 30, P. 663.

¶¶ De Historia Medica Mirabili Lib., III, Cap. I, Edit., 1613.

+ Deutsche Med. Woch., No. 48, 1886.

× Ibid., Feb. 17, 1887.

he reported twenty-two cases in which favorable results had been attained by curettage and the cutting forceps. H. Krause had previously recommended the local application of lactic acid, and this suggestion Heryng also adopted. Moritz Schmidt* at that time spoke of the utility of tracheotomy in these cases. In Germany the surgical treatment of tubercular laryngitis has found many partisans, but on the whole it has not yet made much headway in other countries, and perhaps has not met with the trial it deserves, owing to the distrust aroused by the enthusiastic and exaggerated claims of the early advocates of the method.

We cannot pursue the history of tubercular disease of the air passages further with profit. Its problems are still the most important to the human race of any in the domain of medicine. Very few of them have as yet been solved. The discovery of the tubercle bacillus was only the beginning of the solution of many of them. Perhaps the problem most intimately associated with our specialty is that of the pathway of infection by the tubercle bacillus after coming into contact with the human organism. This question was first prominently broached by Dr. Bollinger in 1890.† With the subsequent development of this, with the discussion in regard to systemic infection and many other questions, we are still actively engaged.

THE STRUCTURE OF ŒDEMATOUS NASAL POLYPI.‡

Without entering into an account of the researches, which have developed our knowledge of the histology of other morbid conditions of the mucosa of the nose and throat, it is advisable that a few words should be said of the history of one question since it involves the proper conception of intra-nasal pathology. This latter is bound up inextricably with the story of the structure of the nasal polypus. We have followed that down to the time of Morgagni. It remains to follow it during the nineteenth century. In the surgery of Chelius§ as late as 1852, we find that he regarded the nasal polypus as a local infiltration of the mucosa with serum, a view of which we have seen prevail almost since the downfall of the Galenic pathology. Frerich|| is said to have been the first to point out that its surface is covered by epithelium similar to that of the surrounding tissue.

* *Deutsche Med. Woch.*, No. 49, 1886.

† *Münchener Med. Woch.*, No. 33, 1890, P. 567.

‡ For a resumé of the history of this subject see a paper by me in the *New York Medical Record*, Jan. 26, 1901.

§ *Handbuch der Chirurgie*, Bd. II., P. 530, 7th Edit. 1852.

|| *De Polyporum Structura Penitior*, 1843.

On referring to an early (1854) American edition of Paget's "Surgical Pathology," we find he classes nasal polypi among the fibro-cellular tumors (P. 386), and in this class he also put those growths shortly afterward described by Virchow under the name of myxoma in the "Krankhafte Geschwülste" (ed. 1863, P. 417), who having previously described myxoma in other publications, dwelt upon the relationship it bears to the retrograde metamorphosis of fatty tumors and of fat tissue, being frequently therefore found in connection with lipomata. He states that myxoma "in adults is relatively infrequent, even in the atrophic metamorphosis of fat tissue in the mucous membranes."* I need only refer in passing to the remarkable mistake made by Billroth† in ascribing the structure usually found in rectal polypi to those found in the nasal cavity. He says he examined twenty cases of nasal polypi, and they were nearly all adenomatous in structure.

It needs only a reference to a few of the modern text-books on pathology to show that the definition of Virchow as to myxoma, in spite of much well grounded criticism, is still universally accepted, and yet in not a few of them has crept the idea that the structure of the nasal polyp conforms to it. Billroth‡ and Cornil and Ranvier (1884) follow him explicitly. Birch-Hirschfeld (1887) speaks of nasal polypi as soft fibromata or myxo-fibromata (Vol. II, P. 381), but evidently he had no experience of his own with these growths, because in his description of myxoma (Vol. I, P. 151) he describes them in the sense of the others. He misquoted Hopmann, who, as we shall see presently, directly repudiated the idea of myxoma of the nose. Weichselbaum (1892) gave a characteristic woodcut and the usual description of true myxoma. Ziegler (Ed. 1895) says that nasal polypi are made up of œdematous connective tissue and mucous tissue, and must therefore be ranked among the fibromata and myxomata (Vol. II, P. 625), but he differs in no way from other pathologists in his description of the latter (Vol. I, P. 397), which are always combined, he says, with the histological forms of other tumors. Delafield and Prudden, in the last edition of their "Pathological Anatomy," state that it is frequently difficult to distinguish between the two; but in the illustration they give of the structure of a mucous polyp of the nose, there is no resemblance to the picture they give under a higher amplification as typical of myxoma.

*In a late address Virchow Arch. Bd. 162, P. 163, hft. I. he remarks incidentally as to this matter: "Es ist ein blosses Spiel mit Worten, wenn man junge pathologische Zellen und Gewebe embryonale nennt." Some account of the question of the doubt as to Virchow's classification of myxoma may be readily found in Councilman's article on "Myxoma" in Wood's "Reference Handbook of the Medical Sciences."

† "Ueber den Bau der Schleimpolypen." 1854.

‡ "Surgical Pathology," 1882.

When we attempt to find who was responsible for the introduction of the term myxoma into nasal pathology, we are baffled by the apparent insidiousness of the process. It seems to have crept in through its use by writers who were either unfamiliar with the myxoma of Virchow, or else unfamiliar with the histological details and the pathogenesis of nasal polypi.

The first mention of a myxoma occurring in the nose which I have been able to find is a report by S. W. Gross in 1871.* We find here the myxomatous error in full bloom.

A glance at the text-books on the nose, which began to appear first a quarter of a century ago, convinces one that the term, if not the conception, of Virchow was well established in the literature of the subject. Michel, indeed, who published in 1875 the first extended work of modern date on the diseases of the nasal cavity, did not, so far as I can see from the translation of Shurly, speak of the polypi as myxomatous, and his conception of their etiology and pathogenesis does not coincide with the view of there being a new growth of tissue. Cohen, whose work first appeared in 1879, accepted the classification of myxoma. Störk, in 1880, did not use the word in connection with them, but in Bosworth's first edition in 1881, they are so classified. Zuckerkandl† very curiously fell into the serious error of Billroth, quoting him with assent in saying they are adenomatous, but he makes no reference to them as myxomatous. Beverly Robinson, in his treatise on "Nasal Catarrh," the second edition of which appeared in 1885, referred to nasal polypi as myxomatous. Morell Mackenzie, began his chapter on nasal polypi by saying they are new formations nearly always of a myxomatous character.‡ I will not pursue text-book literature into more recent time. Suffice it to say that in nearly all of the special works on the nose, this error in nomenclature, if not in conception, still exists.

It is to Hopmann we are indebted for the first serious attempt to dispel it.§ In 1885, he refuted, not only the mistake of Billroth as to their adenomatous nature, but, quoting from the German translation of Mackenzie's book, he denied the latter's assertion as to the myxomatous character of nasal polypi. They are, he asserted, to be looked upon as soft, œdematous fibromata. Chiari, in 1887, said: "On the ground of a histological examination of twenty-three nasal polypi, polypoid hypertrophies, and papillomata, I came to the con-

Return to the
Conception
of Serous
Infiltration.

* Vide. Trans. Path. Soc. of Philadelphia, 1871, P. 219.

† "Normale und Pathologische Anatomie der Nasenhöhle," edition 1882, P. 76.

‡ Am. Ed., 1884, Vol. II. P. 350.

§ Monatschrift für Ohrenheilkunde, 1885, June, P. 161. It is less clearly combated in his paper in Virchow's Archiv., 1883, No. 93, P. 213.

clusion that also in nasal polypi, it was only a matter of serous infiltration of the hypertrophy of the mucosa." In many subsequent papers this view has, I think, been incontrovertibly established—most conclusively, I think, by Hajek*—and it has been urged in this country by myself† and others. The most recent paper dealing with this subject exhaustively is that of Cordes (*Arch. f. Lar. Bd. XI, Hft. 2*). There is very little to be found in it which has not been stated previously by other observers, but it is a very satisfactory confirmation of much work done by others, the publications of which are scattered through rhinological literature.

And now having followed the story of our art over its period of three thousand years and more; from the dim and misty past of incantations and exorcisms, from the early days of Grecian civilization when Hippocrates made a specialty of medical science separating it from the other sciences, to the days of the microscope, and the spectroscope, and the stethoscope, and the laryngoscope; when the space of one man's life is insufficient for him to know anything but the rudiments of our art in many branches, and be, at the same time, in a position to advance in any degree the boundaries of even its smallest province, we may pause with, I trust, a just consideration and appreciation of the labor of our predecessors. Our knowledge has been built up, we have seen, not by the mushroom activity of any one period, or of any one school of medicine, or by the premature birth of an idea or theory, but by the patient, painstaking, laborious exertions of many generations of earnest men, working, for the most part, without expectation or perhaps desire; certainly without the attainments of those rewards, by which not only the layman, but alas, even the average member of our own art, measures what he calls success. To him who knows the joy of work, this phenomenon needs no explanation. To the rest of mankind no explanation would suffice.

* *Arch. f. Lar.*, 1896, Bd. IV. Hft. 3, P. 277.

† *N. Y. Med. Journ.*, Nov. 4, 1893.

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